Appendix F – Crocker Wind Farm Shadow Flicker Assessment

SHADOW FLICKER ASSESSMENT

CROCKER WIND PROJECT

CLARK COUNTY, SOUTH DAKOTA

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1. EXECUTIVE SUMMARY

1.1 INTRODUCTION

Crocker Wind Farm, LLC ('Crocker') is developing the Crocker Wind Farm ('Project') in eastern South Dakota. Currently, the Project is proposed to consist of up to 120 turbines and is considering the following turbine models:

- Vestas V110-2.0 turbines on towers up to 95 meters tall
- GE 2.5-116 turbines on towers up to 90 meters tall
- Gamesa G126-2.625 turbines on towers up to 84 meters tall
- Vestas V136-3.45 turbines on towers up to 82 meters tall

To support the development of the Project, Geronimo Energy, LLC ('Geronimo') completed – on behalf of Crocker - a shadow flicker analysis to estimate levels of flicker potentially associated with the operation of the Project.

1.2 DESCRIPTION OF SHADOW FLICKER AND MODELING

Rotating wind turbine blades may cast shadows during periods when the sun is shining and the turbine is operating. Such shadows may occasionally fall upon homes or other occupied structures (known as receptors) in and near the wind farm area. Expected shadow flicker impacts of the Project have been evaluated by the WindPRO software package, which incorporates the proposed turbine layout, 69 receptors identified by review of aerial imagery, and site-specific meteorological data.

2. SHADOW FLICKER – DEFINITION AND CHARACTERISTICS

Like any tall structure, wind turbines will cast a shadow when the sun is visible. As wind turbines rotate, a flickering or flashing effect may occur when the shadows of the rotating blades cause rapid changes in light intensity at stationary locations such as homes (referred to as receptors). This change in light intensity is known as shadow flicker. Shadow flicker at a receptor may occur only when the following four conditions are met:

- The sun is shining with no cloud cover present;
- The turbine is operating;
- The turbine blades are positioned on a line between the sun and the receptor; and
- The receptor is close enough to the turbine to distinguish the shadow created by the blades.

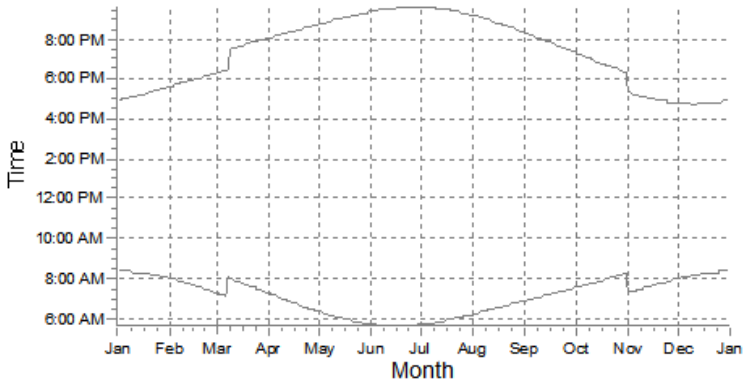
Shadow flicker intensity and frequency of occurrence at a given receptor are determined by several factors:

- **Cloud Cover and Visibility:** If the sun is obscured by clouds, the solar disk is not prominent enough to perceive shadow flicker. Similarly, atmospheric phenomena such as haze, fog, or smoke which would limit visibility also reduce the intensity of shadow flicker because it diffuses the light from the sun.
- **Local Topography:** Elevation differences between the receptor and the turbine location can either increase or decrease frequency of shadow flicker, compared to flat terrain. For example, a receptor may be shielded from the turbine by a prominent hill, wind break, or by other nearby buildings.
- **Wind Speed:** Shadow flicker will only occur if the turbine is operating, as discussed previously. Turbines are designed to operate above a specific wind speed (cut-in speed, generally 3 – 4 m/s for modern wind turbines) and below another specific wind speed (cut-out speed, generally 20 – 25 m/s for modern wind turbines).
- **Wind Direction:** Upwind wind turbines like those proposed at the Project seek to maximize energy production by orienting themselves with blades facing into the wind. The area affected by shadow flicker depends on the orientation of the plane of blade rotation relative to a line between the receptor and the sun. If the other conditions are such that shadow flicker is possible and the plane is close to parallel to the receptor-sun

line, the generation of flicker is negligible at the receptor. Alternatively, if the plane is close to perpendicular the generation of flicker at the receptor may be noticeable.

- **Maintenance:** It is occasionally necessary to shut down wind turbines for maintenance, during which time the turbine will not produce shadow flicker.

- **Sun Angle and Path:** On a given day, shadows cast by the sun are longest during the periods around sunrise and sunset and shortest during mid-day hours. Shadows are also longer in the summer than the winter, with the longest shadows occurring on the summer solstice and shortest shadows occurring on the winter solstice, as seen in the image below:



- **Position of Turbines Relative to Receptors:** The frequency of shadow flicker at a receptor decreases as the distance between the receptor and a wind turbine increases. The frequency is also affected by the location of a wind turbine relative to the receptor. For example, a wind turbine will never cast a shadow on a receptor located directly to its south, since it is never possible for the turbine to lie between the receptor and the sun. A receptor located to the west of the turbine, however, may experience shadow flicker during the early morning hours when the sun is in the eastern sky and low to the ground provided other conditions are met.

- **Distance from Turbines to Receptors:** It is generally accepted that shadow flicker from wind turbines is not perceptible beyond distances of 1500 meters (4921 feet), because the shadow is sufficiently diffuse that the shadow is not seen as a solid obstruction.

Currently, shadow flicker impacts are not regulated by state and federal law; however, a general threshold of 30 hours of shadow flicker exposure is often used as a reference within the wind industry based on a standard goal which has been derived from a German court case in which it was determined that 30 hours of actual observed shadow flicker at a neighbor's property was tolerable [1].

3. SHADOW FLICKER MODELING

Computer models are frequently employed to predict the expected amount of shadow flicker at locations within or around a wind farm. One such model is built into EMD WindPRO 2.9.285, an industry standard software package for the design, assessment, and optimization of wind farms. The WindPRO SHADOW module is able to incorporate the sun's position, topography of the wind farm site, locations of receptors, wind turbine specifications, and the observed wind direction distribution to calculate shadow positions and orientations at one-minute intervals for a calendar year.

3.1 MODEL INPUTS

Crocker has identified 120 positions for turbine placement in the Project area. Figure 1 displays the proposed turbine positions within the wind farm area as well as the receptor locations. Appendix A provides the turbine coordinates. The model was run with the same turbine layout for all four turbine models.

Possible receptor locations were identified from 2015 aerial imagery provided by the Farm Service Agency's (FSA) National Agricultural Imagery Program (NAIP). The locations were further refined by field visits to determine if the buildings were still occupiable and to identify any new buildings since the 2015 photo was taken. A total of 69 receptors were identified within one mile of the project, as seen in Figure 1.

Historical sunshine frequencies (in terms of mean sunlight hours per day) for each calendar month were provided by the WindPRO station database. The nearest site in the database to the Crocker Project is at the National Weather Service (NWS) weather station at Huron, SD. Table 1 lists the percentage of possible sunshine hours that was used in the shadow flicker modeling.

Table 1 – Percent of possible sunshine hours per month at Huron, SD

Average Sunshine Hours Per Day											
Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
52%	54%	58%	63%	65%	66%	74%	78%	68%	59%	51%	51%

Wind direction data collected by an on-site meteorological tower was used in the analysis. The wind direction observations were binned into twelve 30-degree sectors to determine the relative frequency of wind direction at the site. In order to more accurately reflect the anticipated operating conditions in the wind farm, wind speeds outside the operating range of the wind turbines have been removed. An additional downtime of 5% was added to reflect typical observed levels of downtime in modern wind farms. Table 2 below shows the hourly distribution

for the 12 sectors and their number of corresponding hours per direction on an annual basis that was used by the shadow flicker model.

Table 2 - Wind turbine operating hours by direction, Crocker Wind Farm

Operating Hours by Direction													
Sector	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
Frequency (%)	8.5	6.1	5.4	6.7	8.5	11.5	14.9	7.7	5.0	6.1	9.1	10.6	100.0
Hrs/Year	675	480	430	531	678	916	1180	607	394	484	725	837	7937

Finally it was assumed that no shadows would be cast if the sun angle was less than 3 degrees above the horizon, since the depth of the atmospheric column at these angles substantially increases scattering of solar radiation and renders shadows, like those analyzed in this report, incoherent.

Geronimo initially assessed the wind turbine/receptor interaction using the following assumptions:

- Receptors assumed to be transparent in all directions (known as ‘greenhouse’ mode);
- Flat terrain without obstacles which would reduce shadow flicker occurrences;
- Obstructions such as trees and outbuildings not considered

The first run of the model with this configuration indicated four receptors (all participants) would exceed the target 30 hours per year of shadow flicker. A second run of the model was completed which made the following additional assumptions:

- Terrain effects were included, potentially shielding some receptors from flicker impacts
- Aerial imagery near the affected receptors was reviewed, and tree stands were drawn in and added to the model. Trees were assumed to be 40 feet in height based on site visits.

The model was run again with these assumptions, and the results are presented in section 3.2 below.

3.2 MODEL RESULTS

Summary statistics are as follows, for participating and non-participating landowners:

Table 3 - WindPRO shadow flicker results

Hours / Year	Vestas V110	GE 2.5-116	Gamesa G126	Vestas V136
Average - Participant	5.5	5.9	6.1	6.8
Average - Non Participant	3.7	3.9	4.1	4.6
Max - Participant	20.6	21.4	24.1	27.3
Max - Non Participant	12.6	13.7	14.5	16.3

Calculated flicker impacts for each receptor are provided in Appendix B. The model predicts no residences to receive shadow flicker in excess of 30 hours per year.

4. MITIGATION

In the event that Crocker receives complaints about flicker from the Project, impacts can be re-evaluated and mitigation measures will be taken if necessary. Such mitigation measures include but are not limited to planting of additional vegetation near receptors and installation of curtains or blinds in the windows of affected receptors.

Crocker plans to address any post-construction shadow flicker concerns on a case-by-case basis. If shadow flicker concerns are reported to Crocker, project representatives will implement the following procedure:

- Log the contact in Crocker's complaint database to track resolution efforts;
- Prepare site-specific assessment of shadow flicker impacts, noting the time of day, season, and expected duration of future flicker impacts;
- Meet with landowner to discuss site-specific assessment, educate landowners on landowner driven mitigation strategies (e.g. modification of interior lighting) and discuss concerns;
- Assess the residence to determine if on-site mitigation measures, including but not limited to, installation of exterior or interior screening, are appropriate for the level of impact and effectively address the concern;
- Work with landowner to develop a mitigation plan; and
- Implement the mitigation plan.

Crocker's goal is to resolve all flicker related complaints the project may receive satisfactorily. Crocker has preference for the least intrusive methodology for mitigating any effects first by engaging with the landowner through education, and will go to more intrusive measures in the event that education is not sufficient in resolving the matter with the landowner.

5. CONCLUSION

An analysis of potential shadow flicker impacts from the Crocker Wind Farm on nearby receptors indicates that the effects are expected to be minor and well within tolerances that do not present concerns for nuisance. No residences are expected to experience over 30 hours per year of shadow flicker.

6. REFERENCES

1. WindPower. 2003. Danish Wind Industry Association. Shadow Casting From Wind Turbines. http://guidedtour.windpower.org/en/tour/env/shadow/index.html. Accessed 20 June 2013.

APPENDIX A – TURBINE LAYOUT

Turbine ID	X	Y
1	590446	4995368
2	590826	4995399
3	590462	4994532
4	590855	4994567
7	590405	4992661
12	588367	4993133
13	589507	4992362
14	589170	4992179
15	588511	4991794
16	588805	4992040
17	588196	4991533
19	587827	4991215
20	588910	4990931
21	589252	4991113
23	586676	4989647
25	587518	4989827
28	586966	4990561
41	593513	4989472
43	594307	4990293
47	593136	4990460
48	593455	4990714
51	589815	4990311
52	589526	4989977
53	587806	4987122
54	588146	4987232
55	588519	4987316
59	592709	4988584
60	594328	4988774
61	593605	4988756
62	593971	4988637
63	594313	4987114
66	595331	4985968
67	595952	4984823

69	590976	4991691
71	590066	4991288
72	588098	4988758
77	590206	4994221
79	594791	4988927
81	594979	4988071
82	595484	4988193
86	585866	4990367
87	585381	4990128
88	585004	4990030
89	586955	4993047
90	587393	4993196
91	587601	4993558
92	587904	4993894
93	588322	4994123
94	588666	4994332
95	585865	4993126
96	586215	4993311
99	587704	4988626
100	587352	4988518
101	587479	4987004
102	585141	4986998
112	596716	4983553
113	597103	4983688
114	597481	4983841
115	596357	4985266
118	596664	4986183
119	596443	4985662
120	595647	4986675
128	597016	4992918
133	600045	4992861
139	599358	4991855
140	599889	4992270
142	598757	4991642
143	598230	4991636
144	597909	4991376
145	597119	4990935
149	596421	4992296
150	596258	4991988

151	597212	4991751
152	599674	4991977
155	590086	4995319
158	588119	4995351
160	601023	4992868
165	600199	4992455
166	593055	4995948
167	593334	4996080
168	593924	4995957
169	594237	4996145
177	594145	4997168
178	594884	4998127
179	595007	4998682
180	594540	4998791
181	593942	4998652
182	594154	4999135
184	593745	4998184
185	593500	4997892
186	593460	4997515
187	592998	4997353
189	592551	4996429
190	592161	4996366
191	591793	4996200
192	591487	4996743
194	592535	4996808
196	592552	4997736
197	592286	4998107
198	592607	4998308
199	592182	4998619
204	590293	4999012
205	589685	4999053
206	589971	4998678
207	589710	4997974
210	589826	4997002
211	590628	4996420
212	590518	4995975
213	589046	4987452
214	589469	4987379
215	590064	4999943

216	590394	5000214
218	590876	5000318
220	591643	4999214
221	592152	4999950
222	592588	5000305
223	593819	5000160
224	594210	5000303
228	595117	4991378
230	591342	4997941

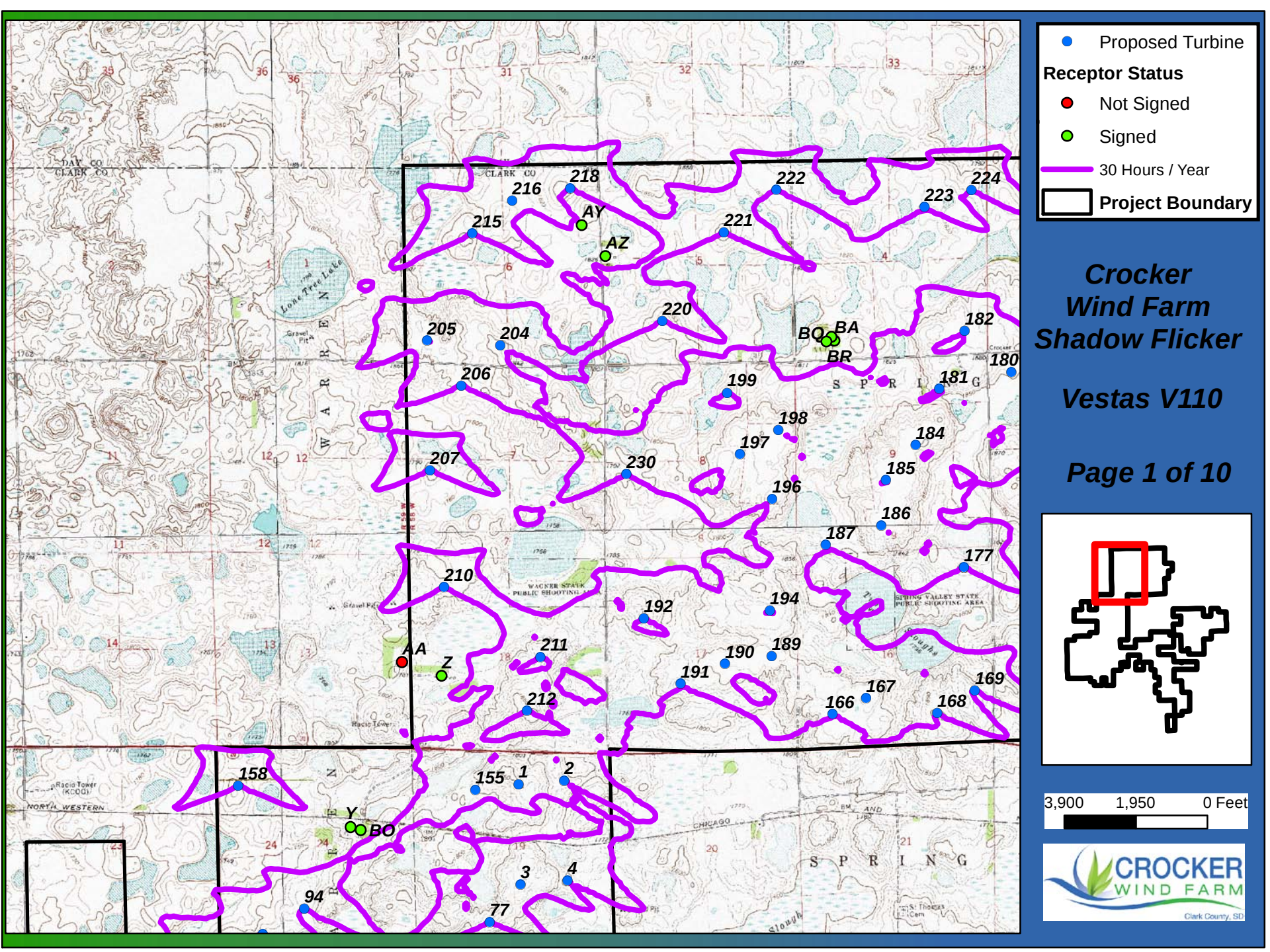
APPENDIX B – SHADOW FLICKER MODEL CALCULATIONS

Table 4 - Shadow flicker model results (hours/year

Receptor ID	X	Y	Status	Vestas V110	GE 2.5-116	Gamesa G126	Vestas V136
A	590215	4984375	Not Signed	0.0	0.0	0.0	0.0
B	592905	4982767	Not Signed	0.0	0.0	0.0	0.0
C	593621	4982899	Not Signed	0.0	0.0	0.0	0.0
D	594438	4982965	Not Signed	0.0	0.0	0.0	0.0
E	594441	4982938	Not Signed	0.0	0.0	0.0	0.0
F	594693	4983210	Not Signed	0.0	0.0	0.0	0.0
G	594519	4983773	Not Signed	0.0	0.0	0.0	0.0
H	596400	4982305	Not Signed	0.0	0.0	0.0	0.0
I	592936	4984691	Not Signed	0.0	0.0	0.0	0.0
J	595192	4987670	Signed	3.7	4.1	4.7	5.3
K	595235	4987682	Signed	3.3	3.7	4.2	4.7
L	592572	4987591	Not Signed	0.0	0.0	0.0	0.0
M	591745	4987550	Not Signed	0.0	0.0	0.0	0.0
N	591250	4987761	Not Signed	0.0	0.0	0.0	0.0
O	591309	4985133	Not Signed	0.0	0.0	0.0	0.0
P	591254	4985097	Not Signed	0.0	0.0	0.0	0.0
Q	588307	4990356	Signed	9.5	8.6	9.1	10.2
R	588363	4990439	Signed	9.4	10.3	11.1	12.4
S	589765	4989174	Signed	0.0	0.0	0.0	0.0
T	590678	4989108	Not Signed	0.0	0.0	0.0	0.0
U	592788	4990118	Signed	7.4	7.9	8.1	9.0
V	591434	4990459	Not Signed	0.0	0.0	0.0	0.0
W	595290	4990577	Signed	2.5	2.7	2.7	3.0
X	586483	4986148	Not Signed	0.0	0.0	0.0	0.0
Y	589053	4995011	Signed	15.7	16.9	17.0	18.9
Z	589810	4996269	Signed	16.5	18.3	20.6	23.3
AA	589479	4996382	Not Signed	5.9	6.5	6.9	7.7
AC	586123	4988414	Not Signed	2.7	3.0	3.3	3.6
AD	585759	4988139	Not Signed	0.0	0.0	0.0	0.0
AE	586437	4993856	Signed	8.6	9.3	9.9	11.0

AF	596671	4988021	Signed	3.0	3.3	3.3	3.7
AG	597128	4988613	Not Signed	0.0	0.0	0.0	0.0
AH	597790	4987894	Signed	0.0	0.0	0.0	0.0
AI	594515	4984683	Not Signed	1.3	1.4	1.4	1.5
AJ	597595	4984415	Signed	1.9	2.2	1.9	2.4
AK	597745	4984180	Signed	0.0	0.0	0.0	0.0
AL	597664	4989856	Not Signed	0.0	0.0	0.0	0.0
AM	599366	4989263	Not Signed	0.0	0.0	0.0	0.0
AN	600502	4989799	Not Signed	0.0	0.0	0.0	0.0
AO	600068	4991329	Signed	2.4	2.6	2.6	2.9
AP	600593	4992468	Signed	2.8	3.0	3.1	3.4
AQ	602318	4991733	Not Signed	0.0	0.0	0.0	0.0
AR	601265	4992656	Signed	6.3	6.8	6.8	7.5
AS	602397	4994189	Not Signed	0.0	0.0	0.0	0.0
AT	600784	4994037	Signed	0.0	0.0	0.0	0.0
AU	599752	4994156	Not Signed	0.0	0.0	0.0	0.0
AV	599532	4993077	Signed	20.6	21.4	24.1	27.3
AW	597589	4993202	Signed	10.2	11.3	12.2	13.6
AX	595549	4994075	Not Signed	0.0	0.0	0.0	0.0
AY	590973	5000013	Signed	2.4	2.6	2.7	2.9
AZ	591169	4999757	Signed	17.9	19.4	19.2	21.5
BA	593071	4999055	Signed	13.6	14.7	15.3	17.1
BB	595173	4999095	Signed	17.2	19.2	17.8	20.9
BC	595106	4999099	Signed	13.9	15.4	16.2	17.8
BD	595405	4996510	Not Signed	7.8	8.3	8.4	9.0
BE	595849	4999735	Not Signed	0.0	0.0	0.0	0.0
BF	597376	4999189	Not Signed	0.0	0.0	0.0	0.0
BG	596304	4998805	Not Signed	1.8	2.0	2.0	2.2
BH	588528	4990460	Signed	7.8	8.5	9.5	10.7
BI	596208	4981797	Signed	0.0	0.0	0.0	0.0
BJ	597641	4985322	Not Signed	5.5	5.9	6.1	6.7
BK	586275	4988055	Signed	5.9	6.6	7.0	8.0
BL	594426	4990982	Signed	11.3	12.1	12.7	13.8
BM	594454	4984843	Not Signed	1.0	1.1	1.1	1.2
BN	586113	4992710	Not Signed	12.6	13.7	14.5	16.3
BO	589139	4994987	Signed	17.9	19.1	19.3	21.2
BP	596006	4997304	Not Signed	0.0	0.0	0.0	0.0
BQ	593050	4999084	Signed	12.6	13.6	14.2	15.8
BR	593008	4999047	Signed	12.4	13.5	14.1	15.7

APPENDIX C – SHADOW FLICKER RESULTS MAPS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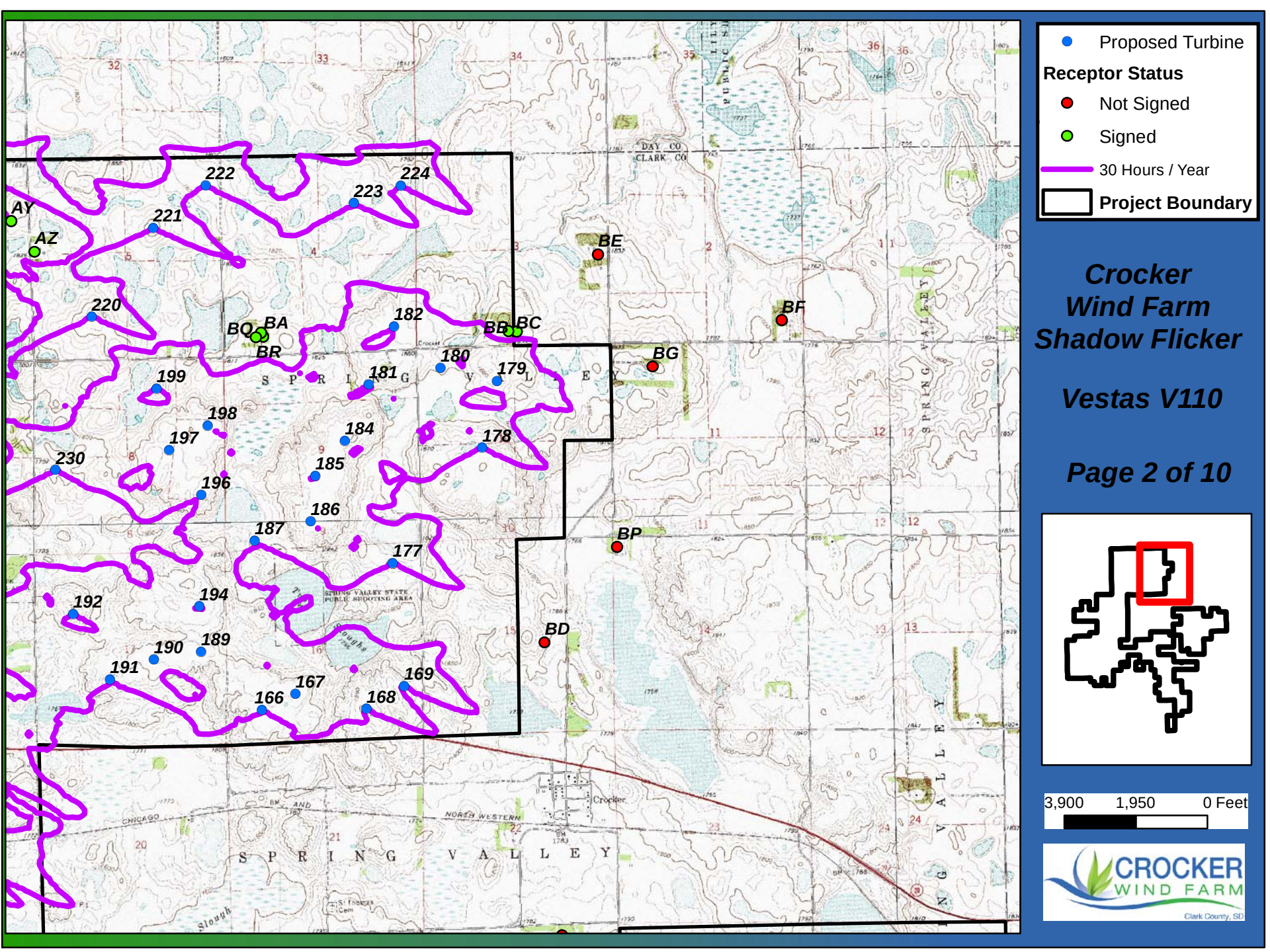
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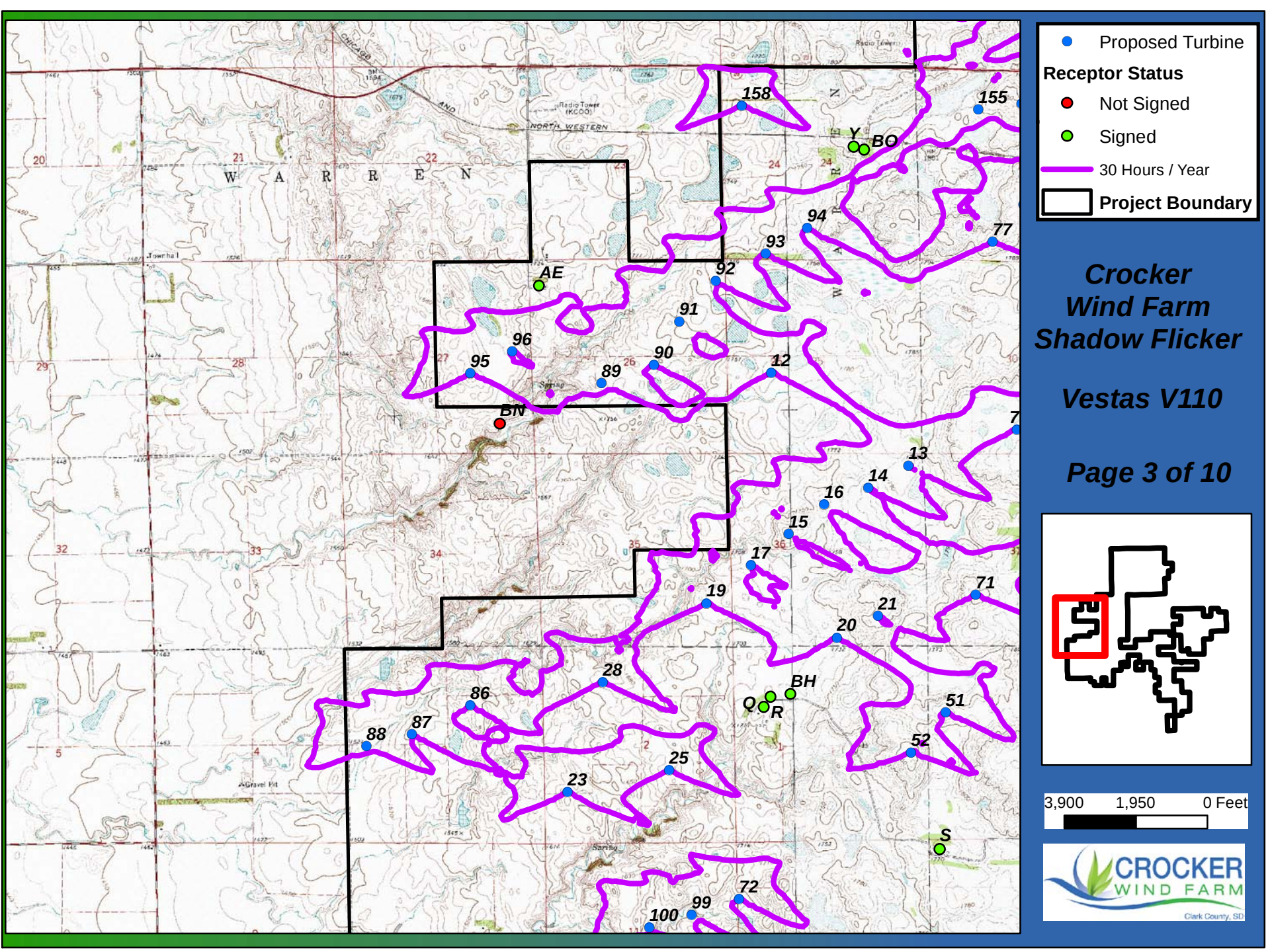
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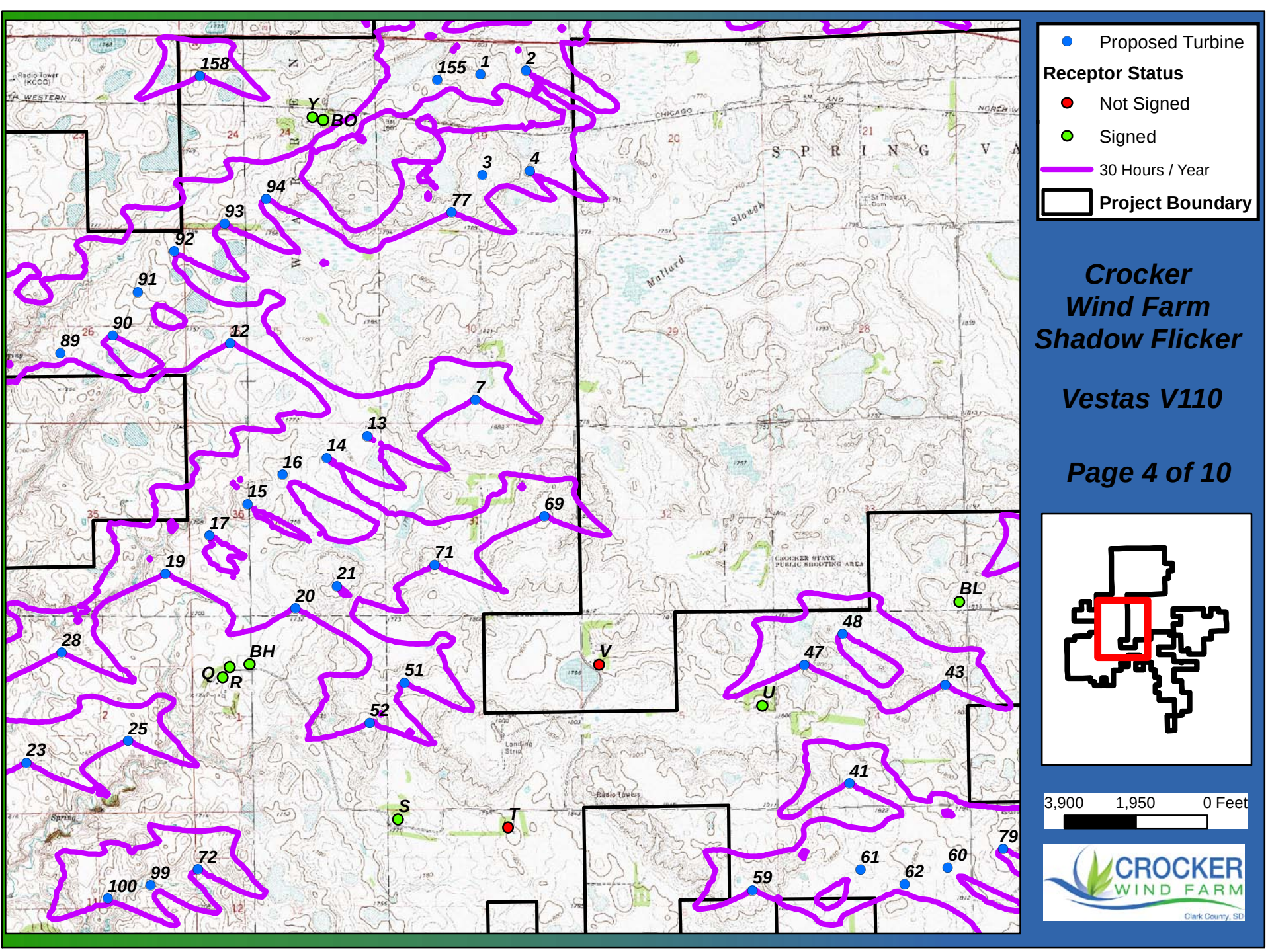
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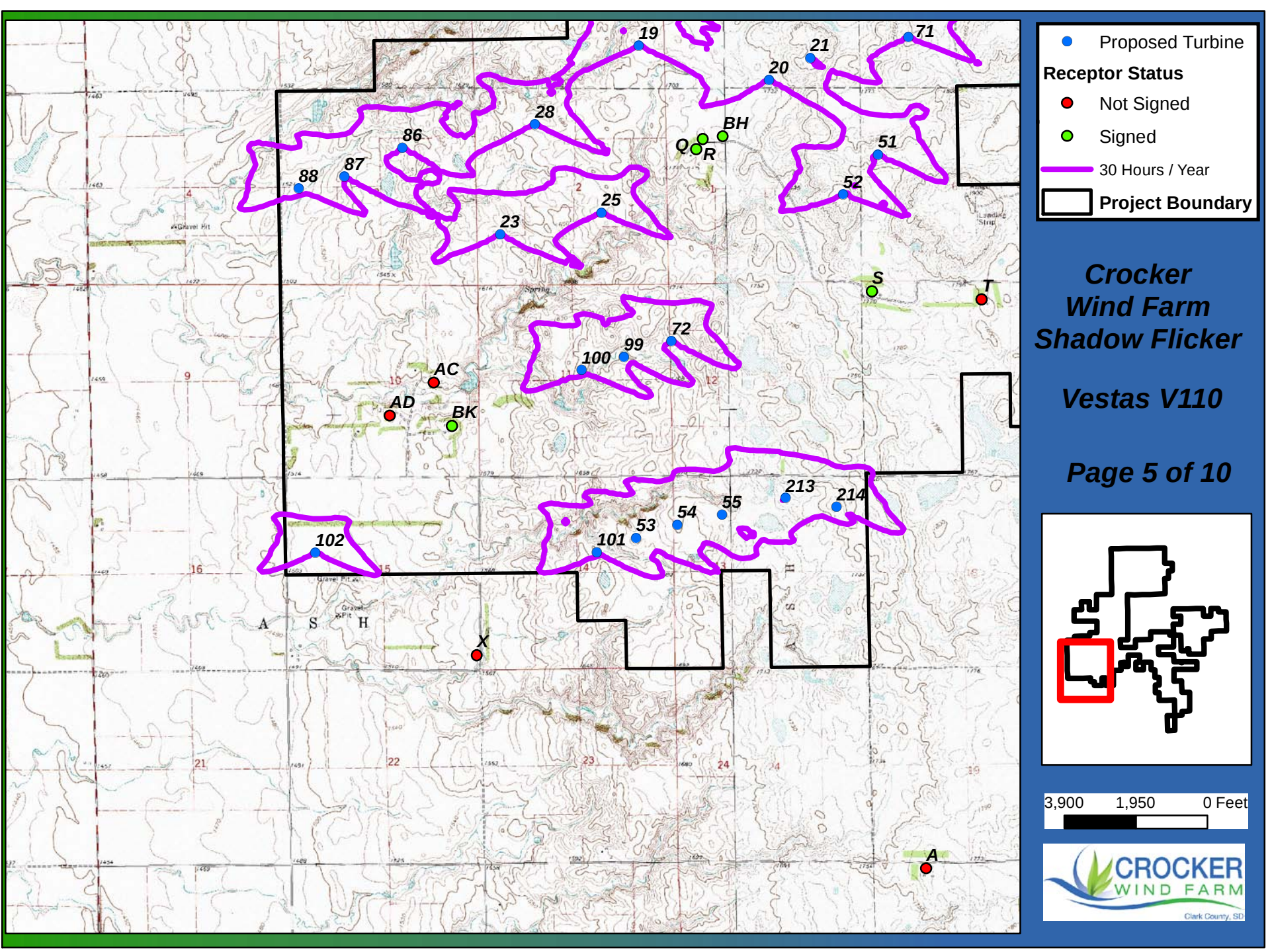
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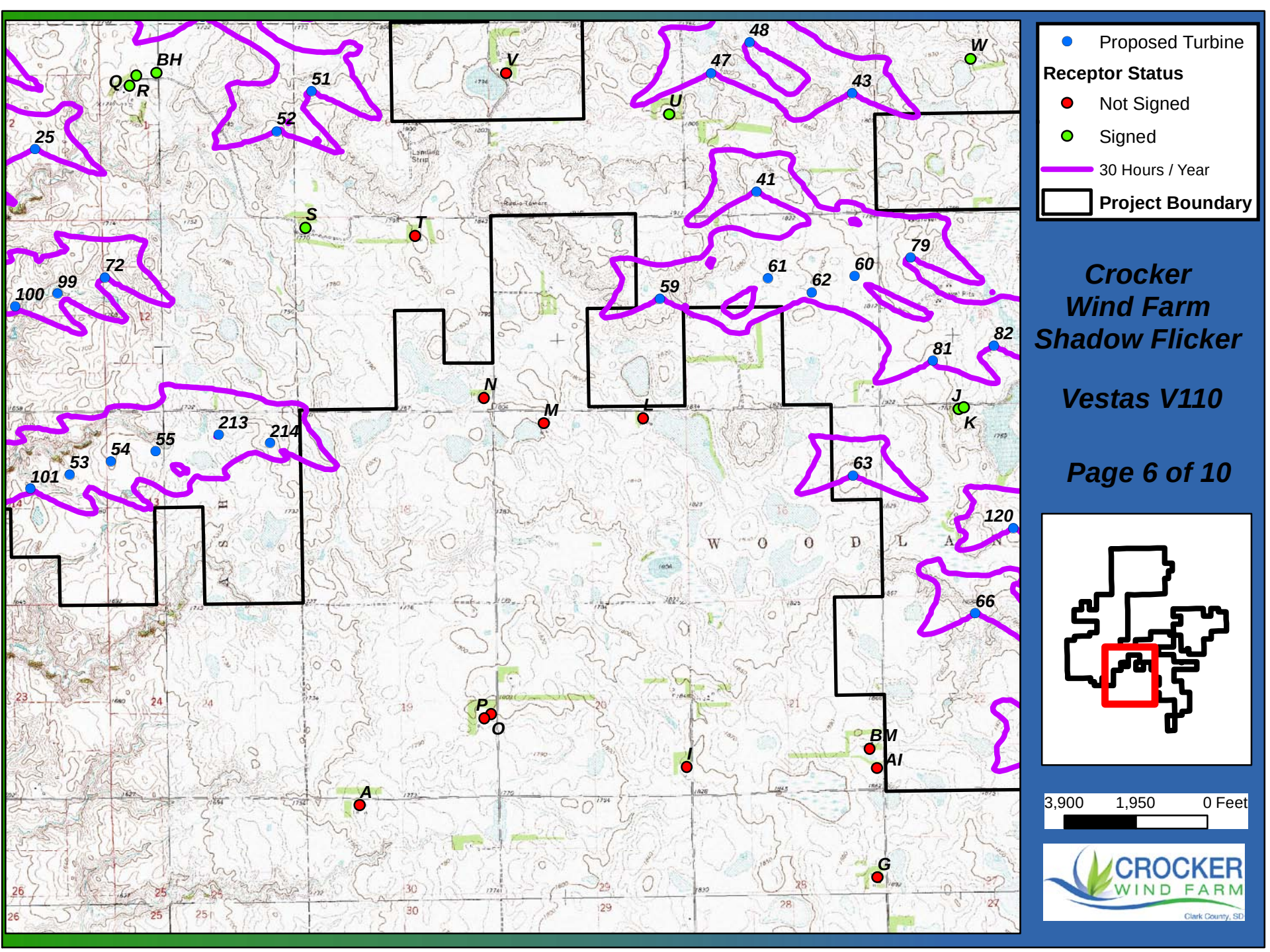
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Page 6 of 10
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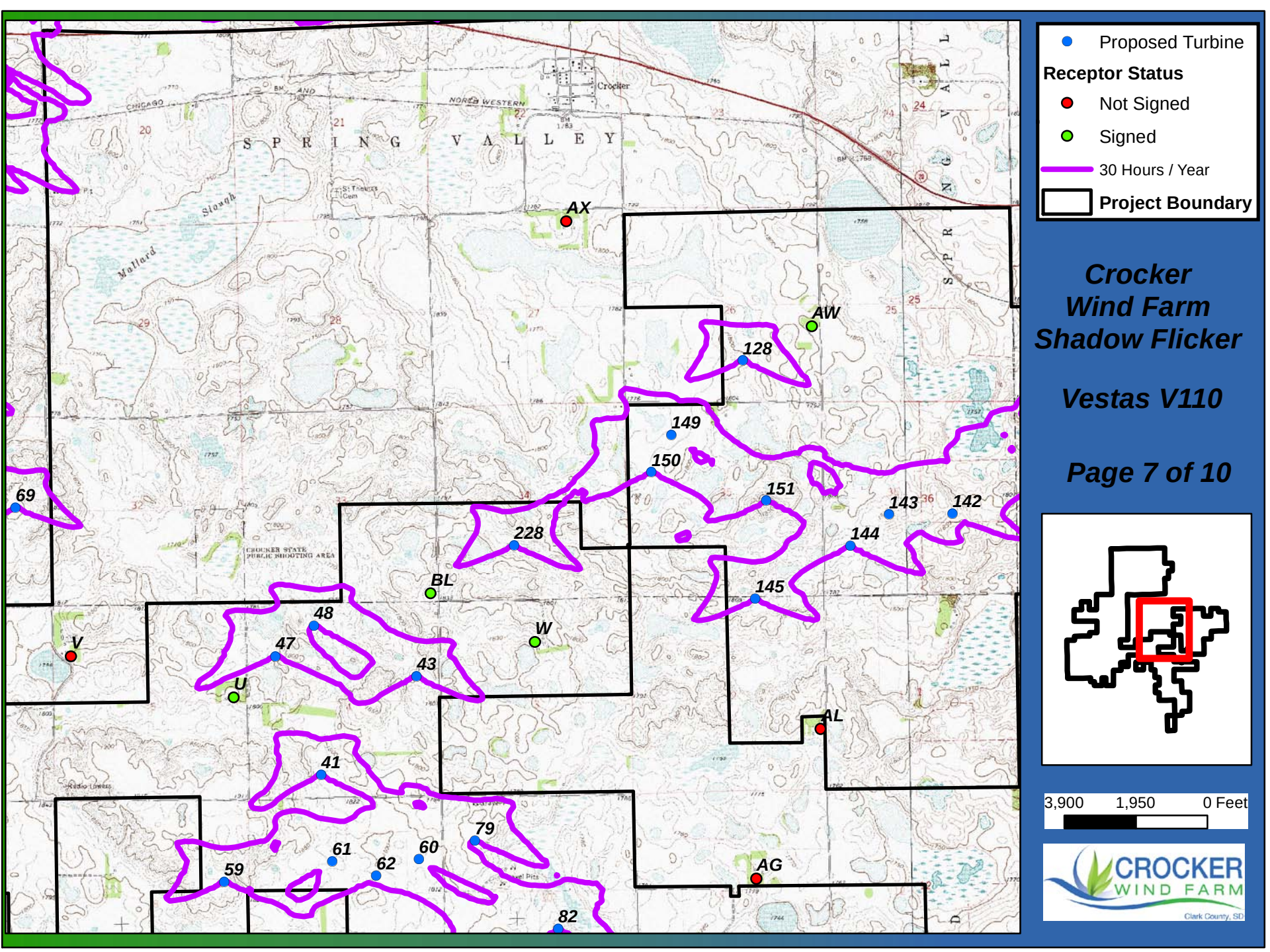
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Crocker Wind Farm Shadow Flicker
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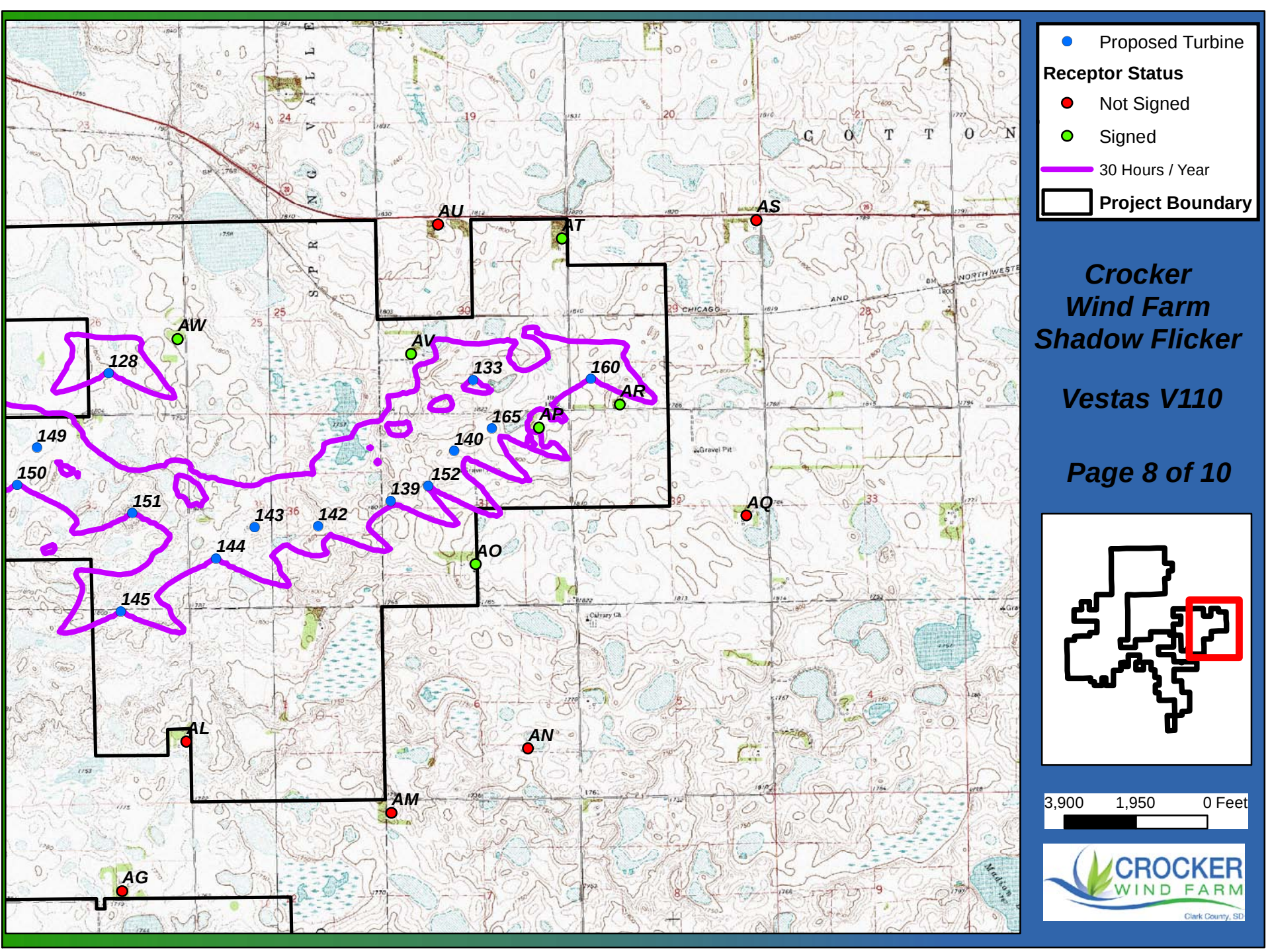
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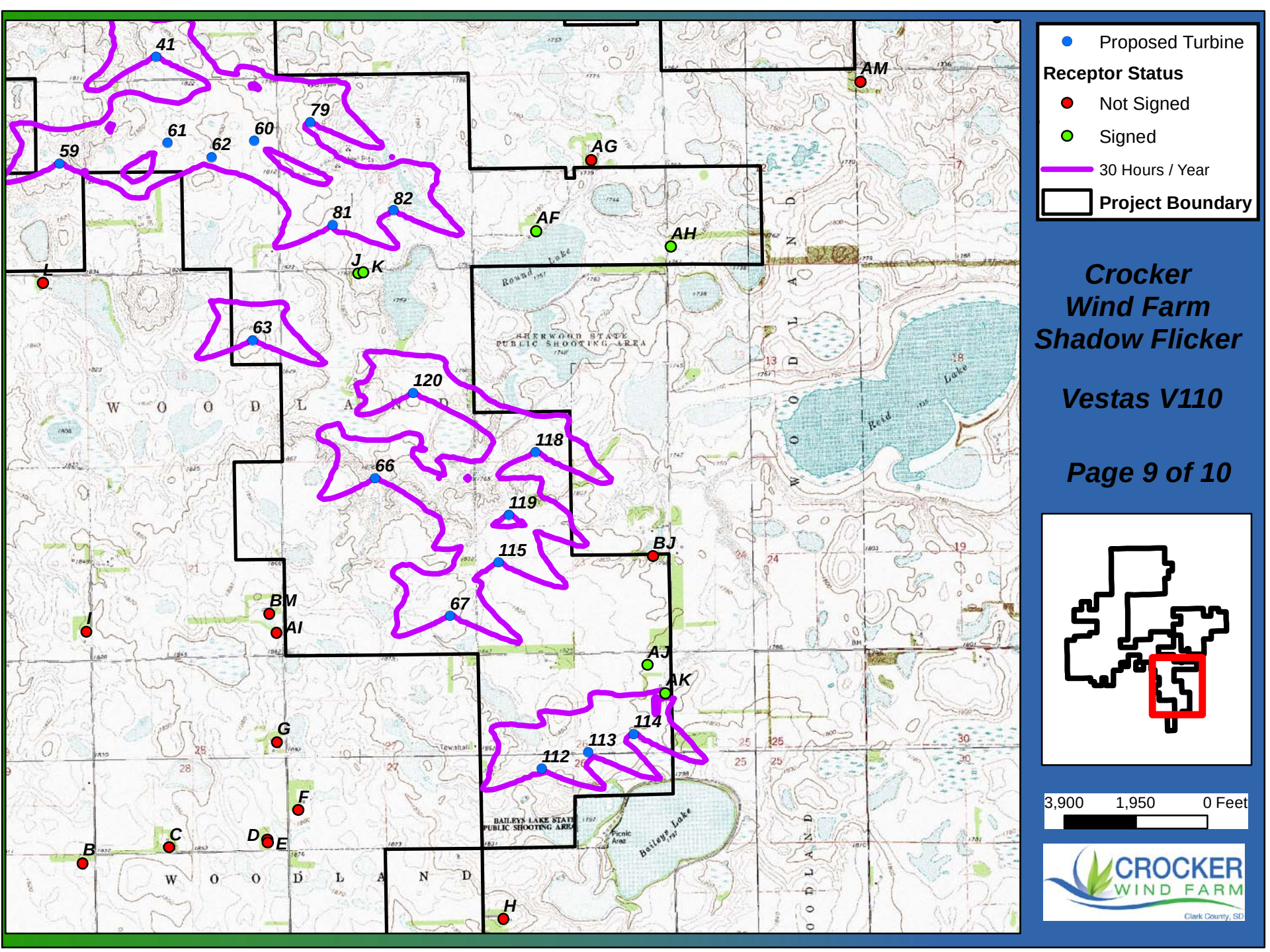
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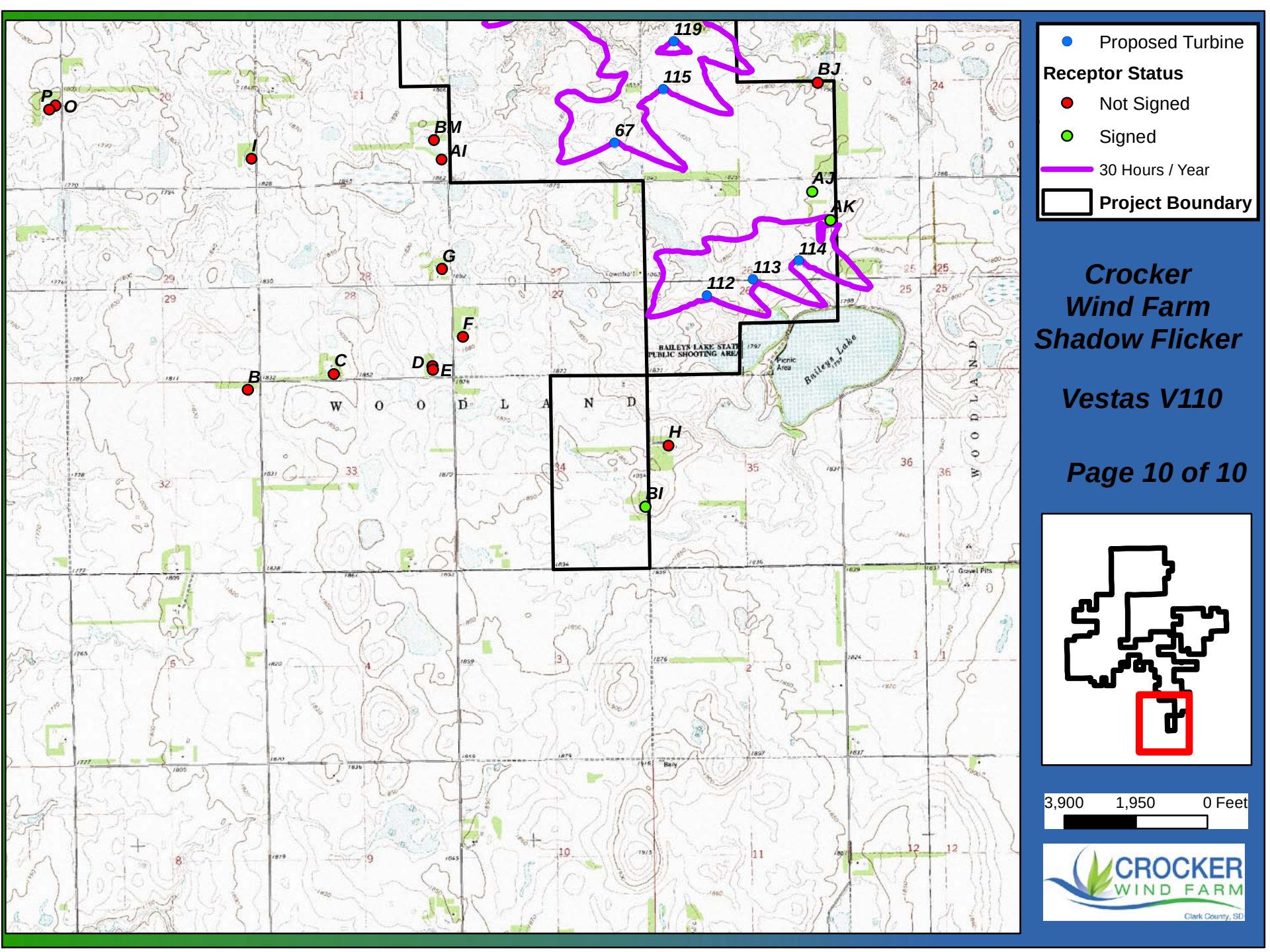
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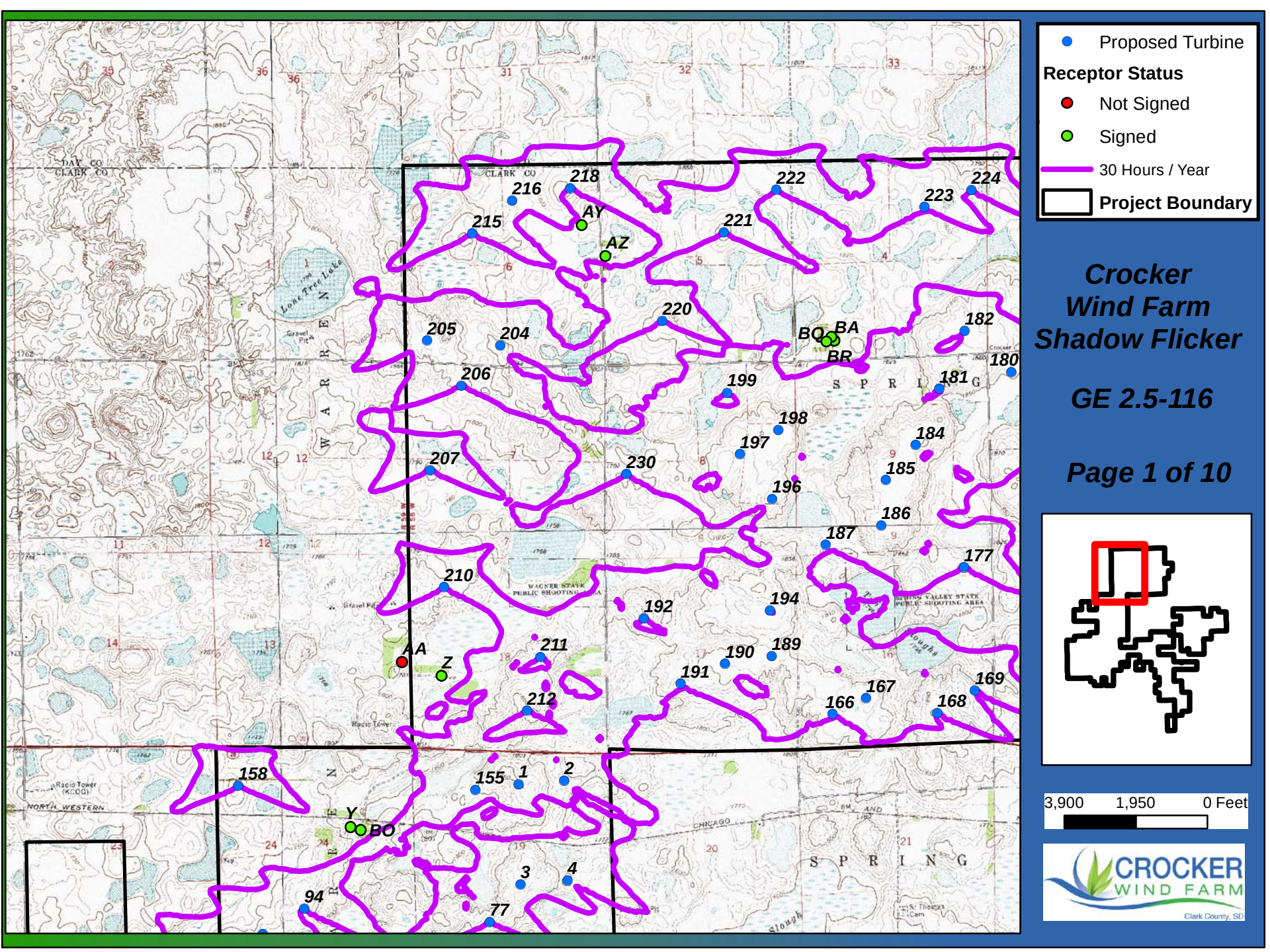
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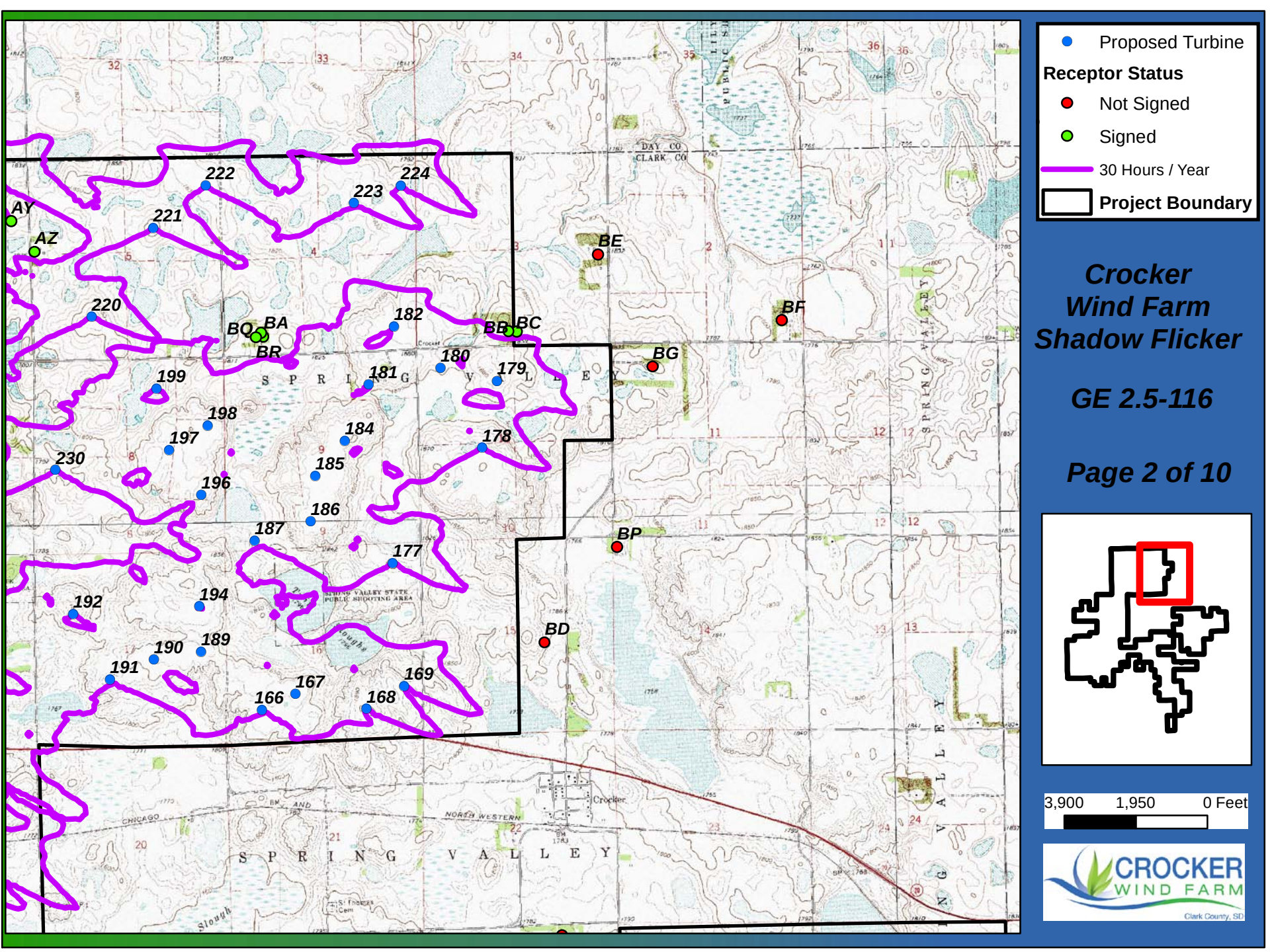
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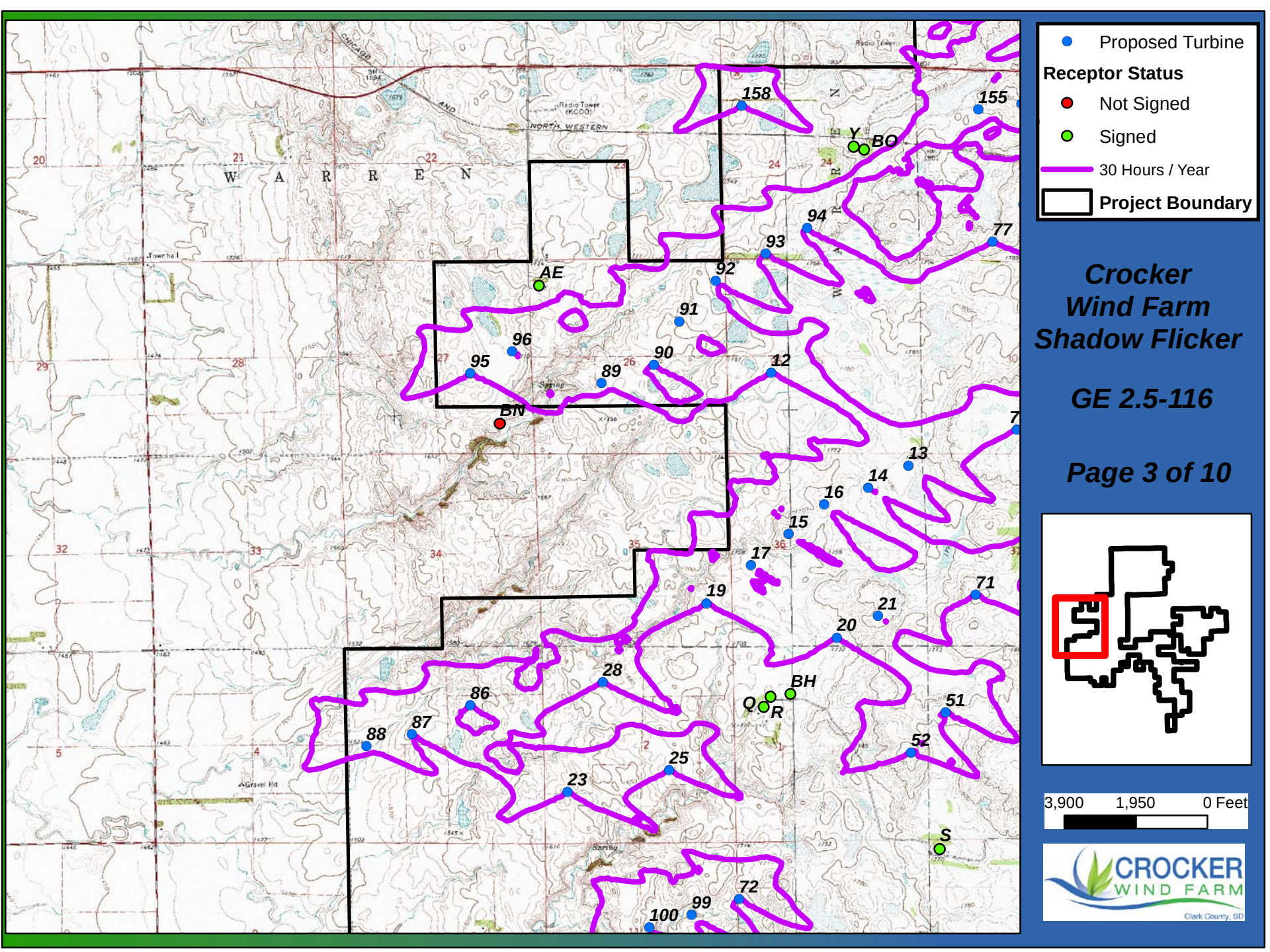
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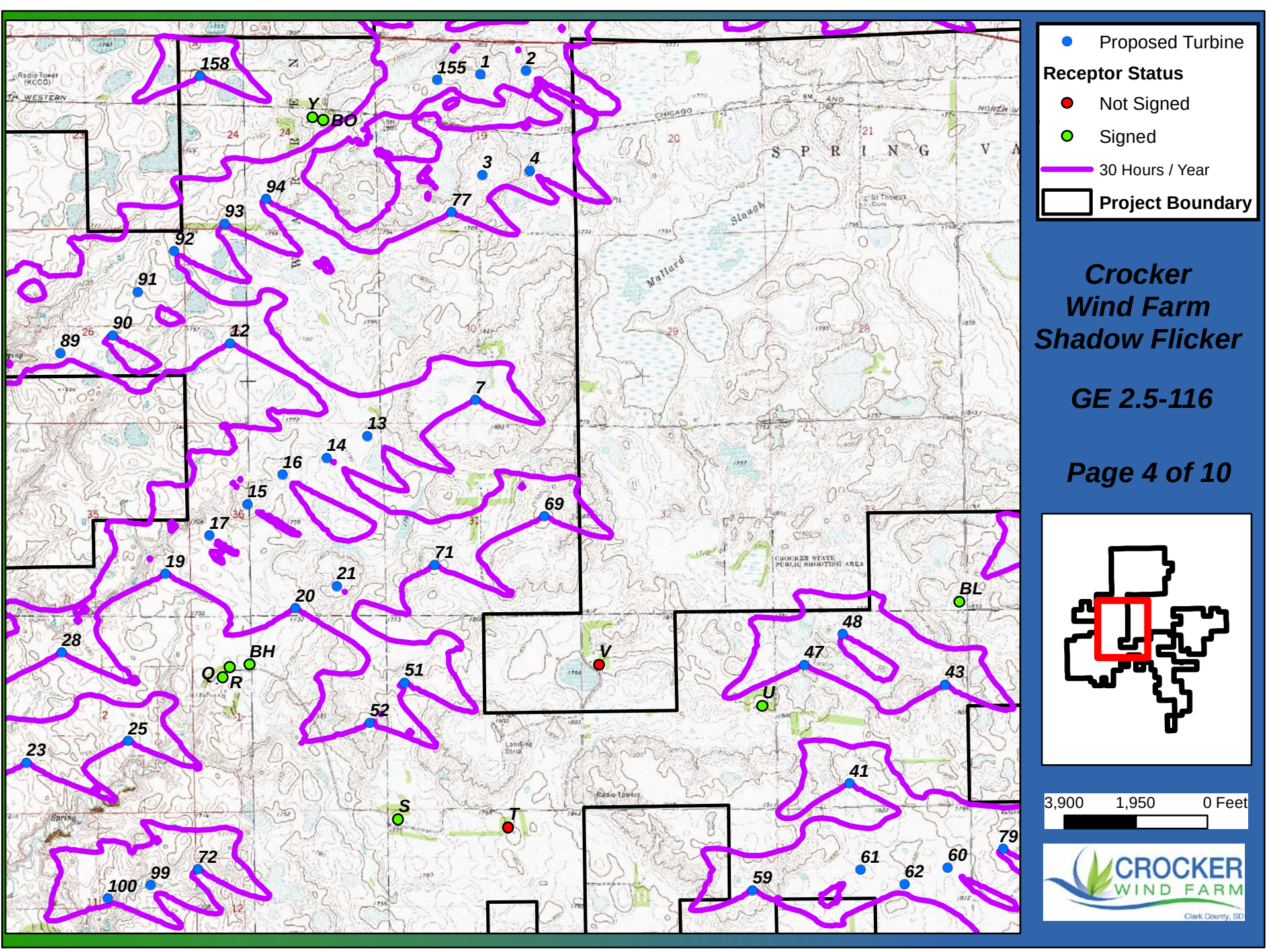
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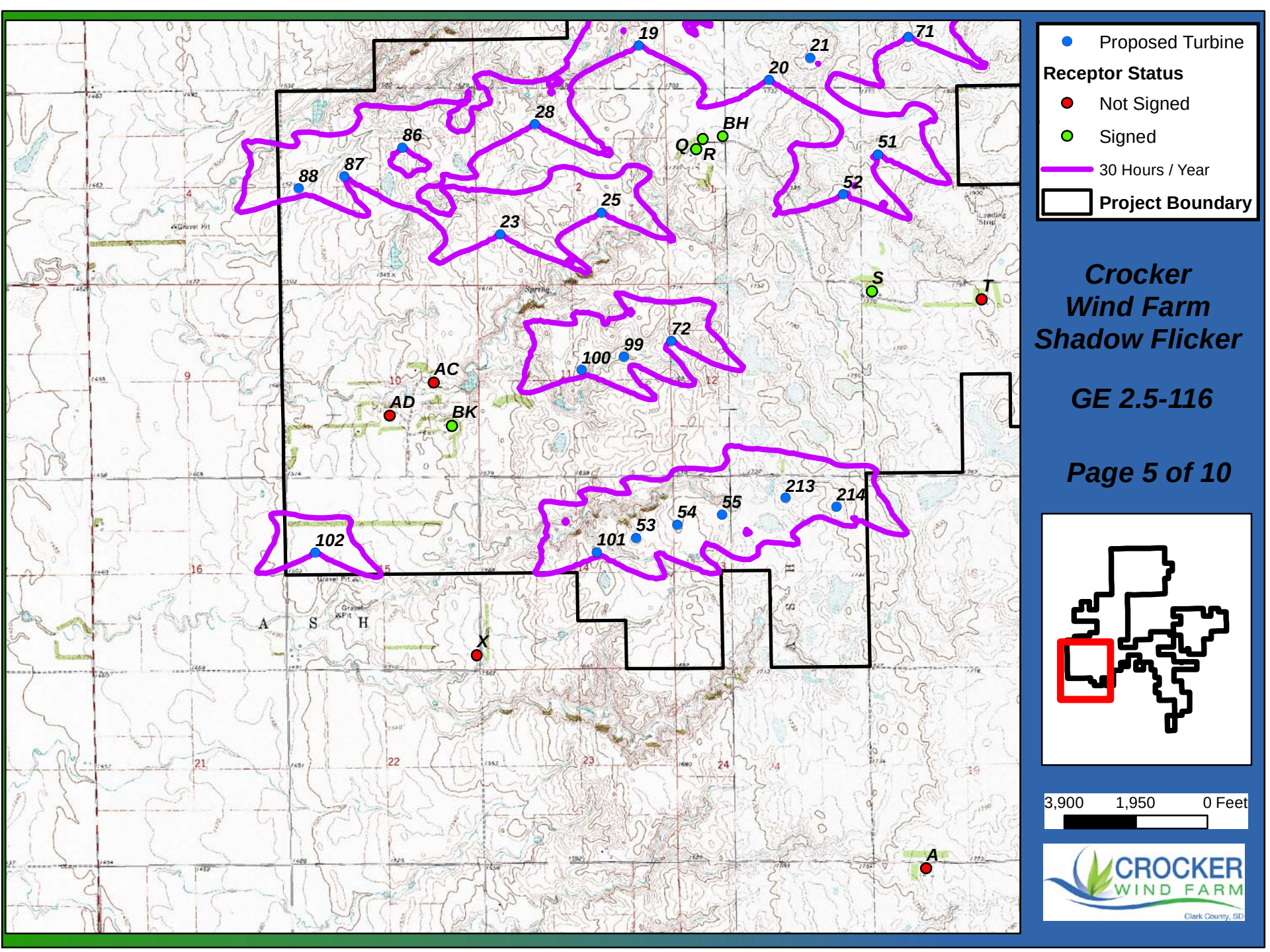
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Crocker Wind Farm Shadow Flicker
GE 2.5-116
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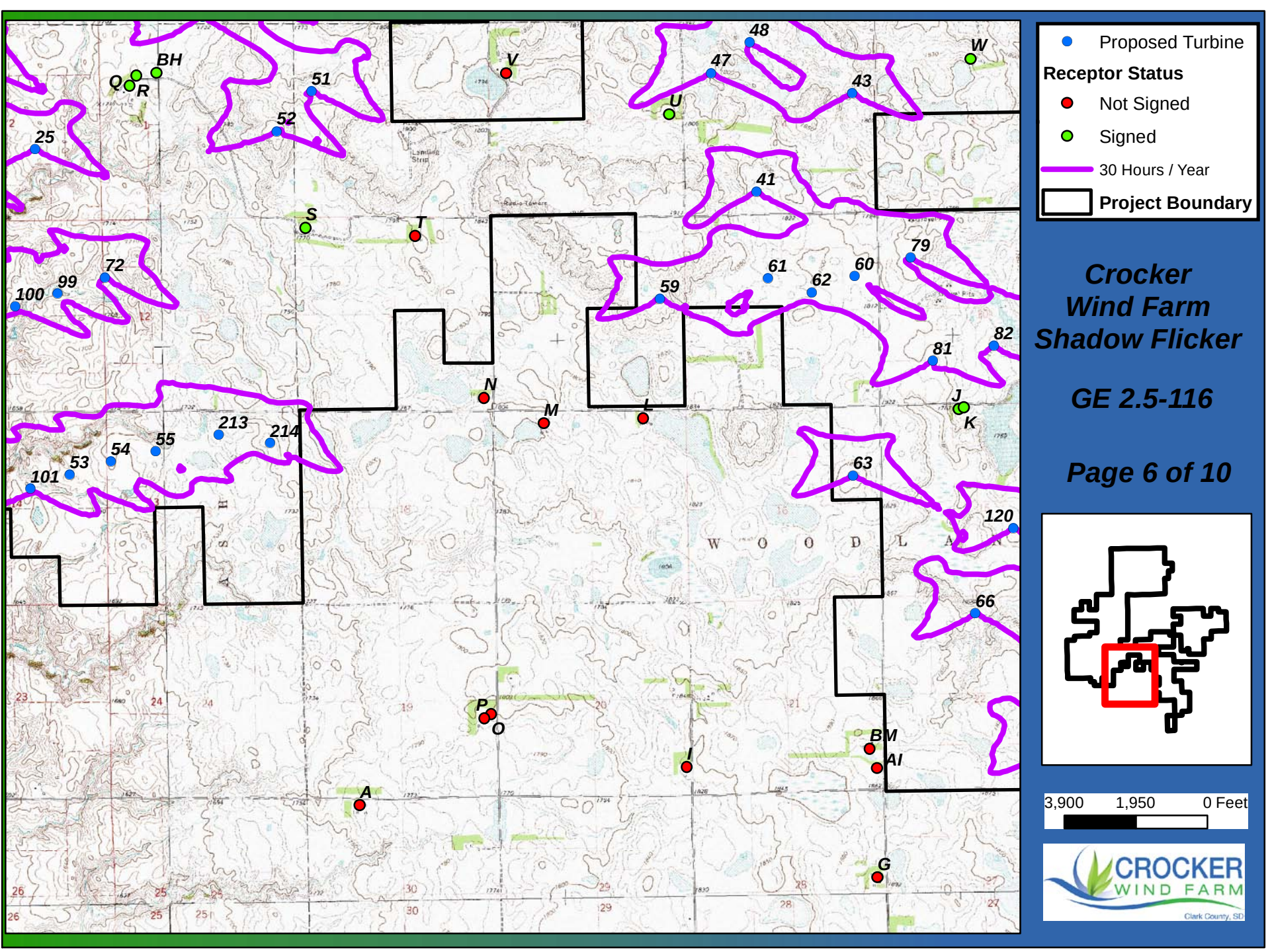
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Crocker Wind Farm Shadow Flicker
GE 2.5-116
Page 6 of 10
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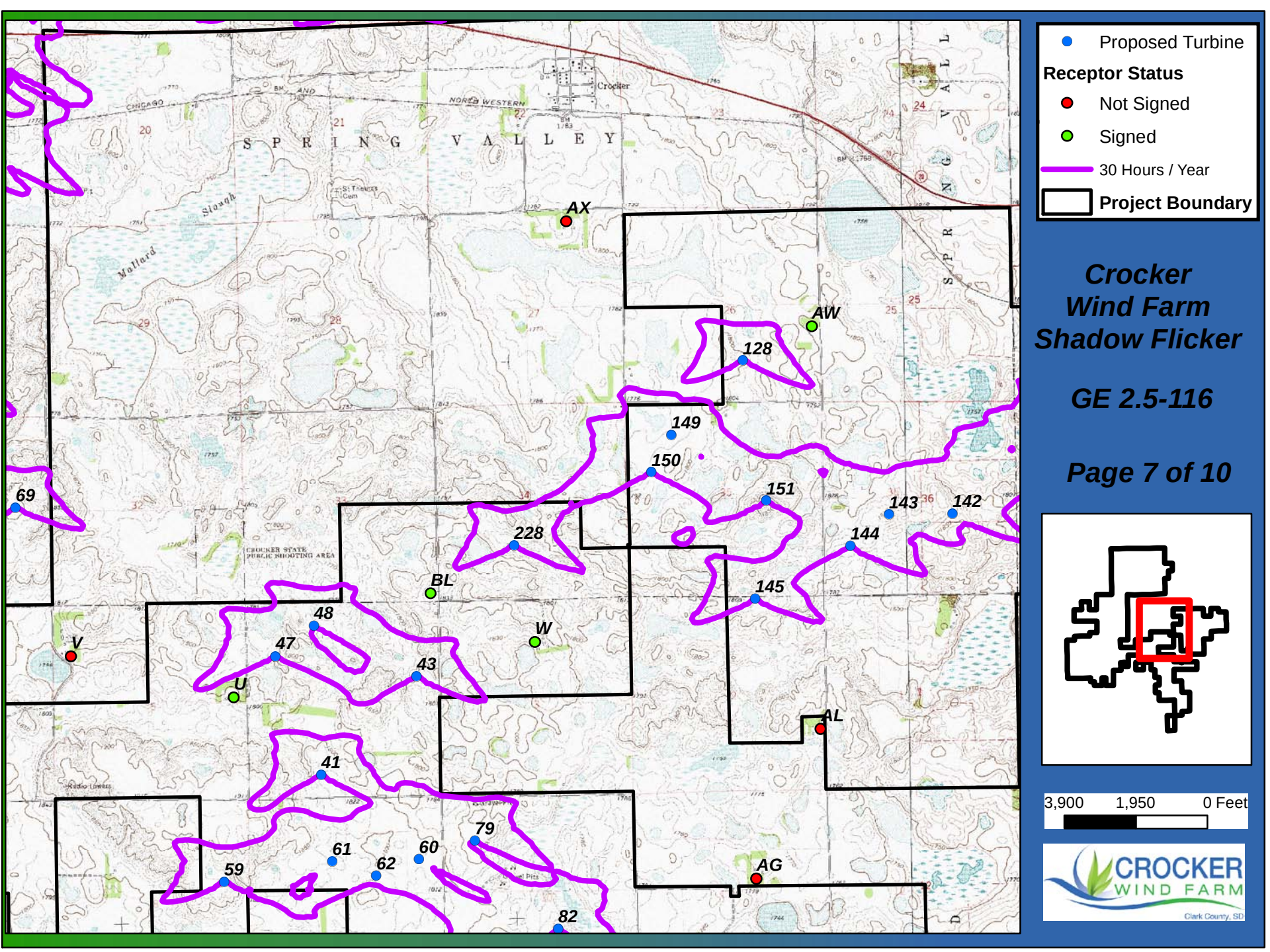
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Crocker Wind Farm Shadow Flicker
GE 2.5-116
Page 7 of 10
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CROCKER WIND FARM
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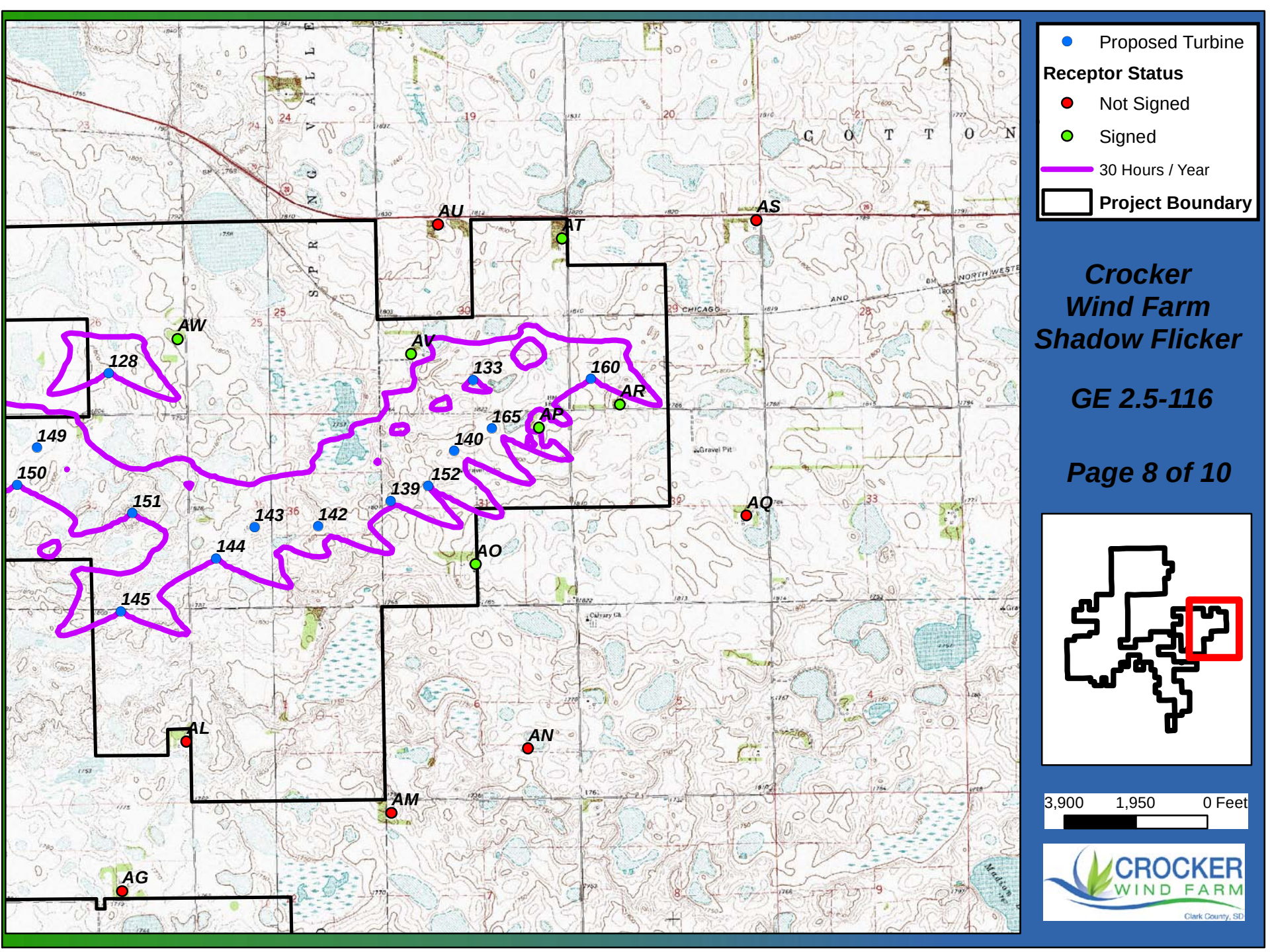
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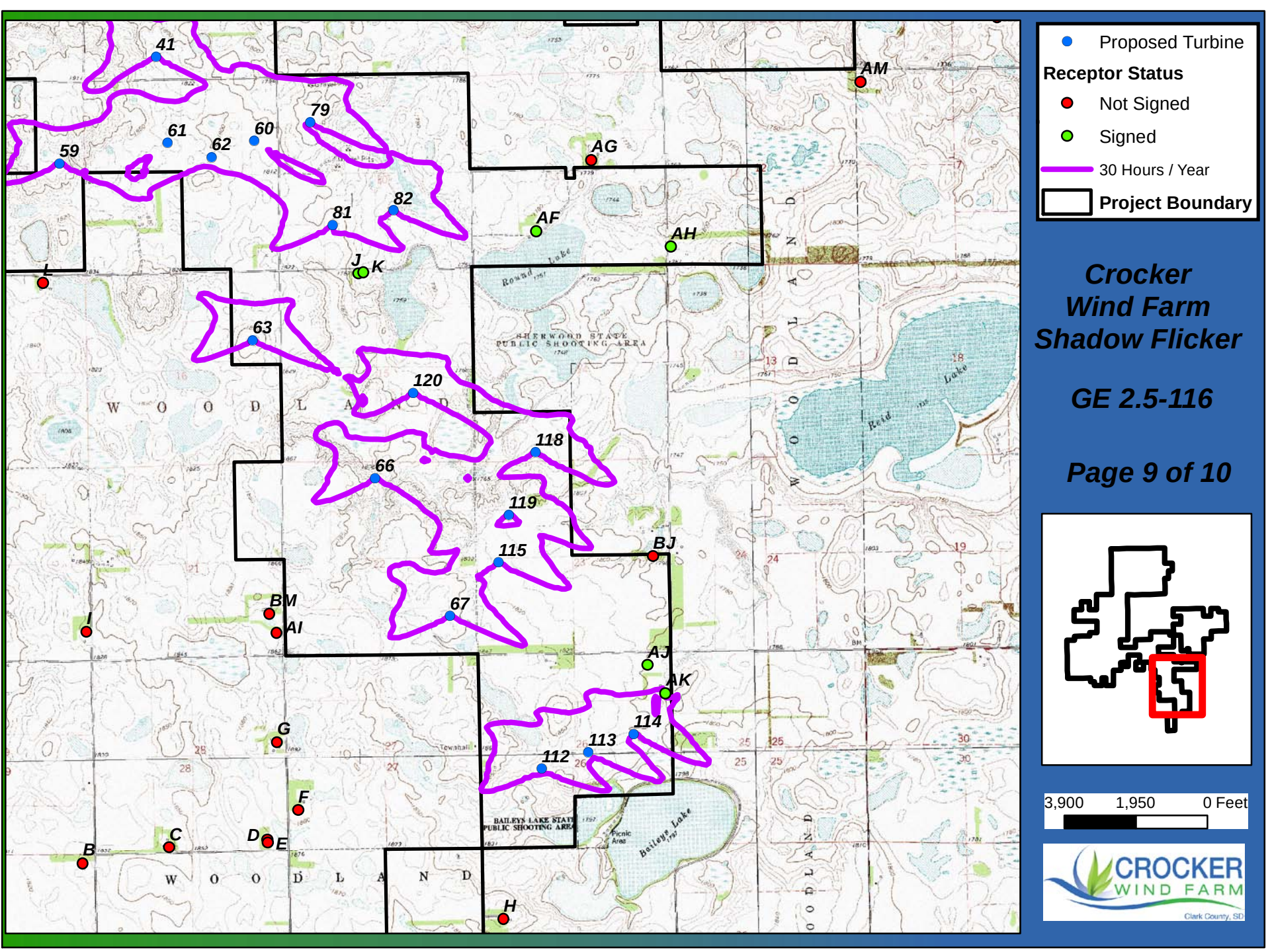
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GE 2.5-116
Page 9 of 10
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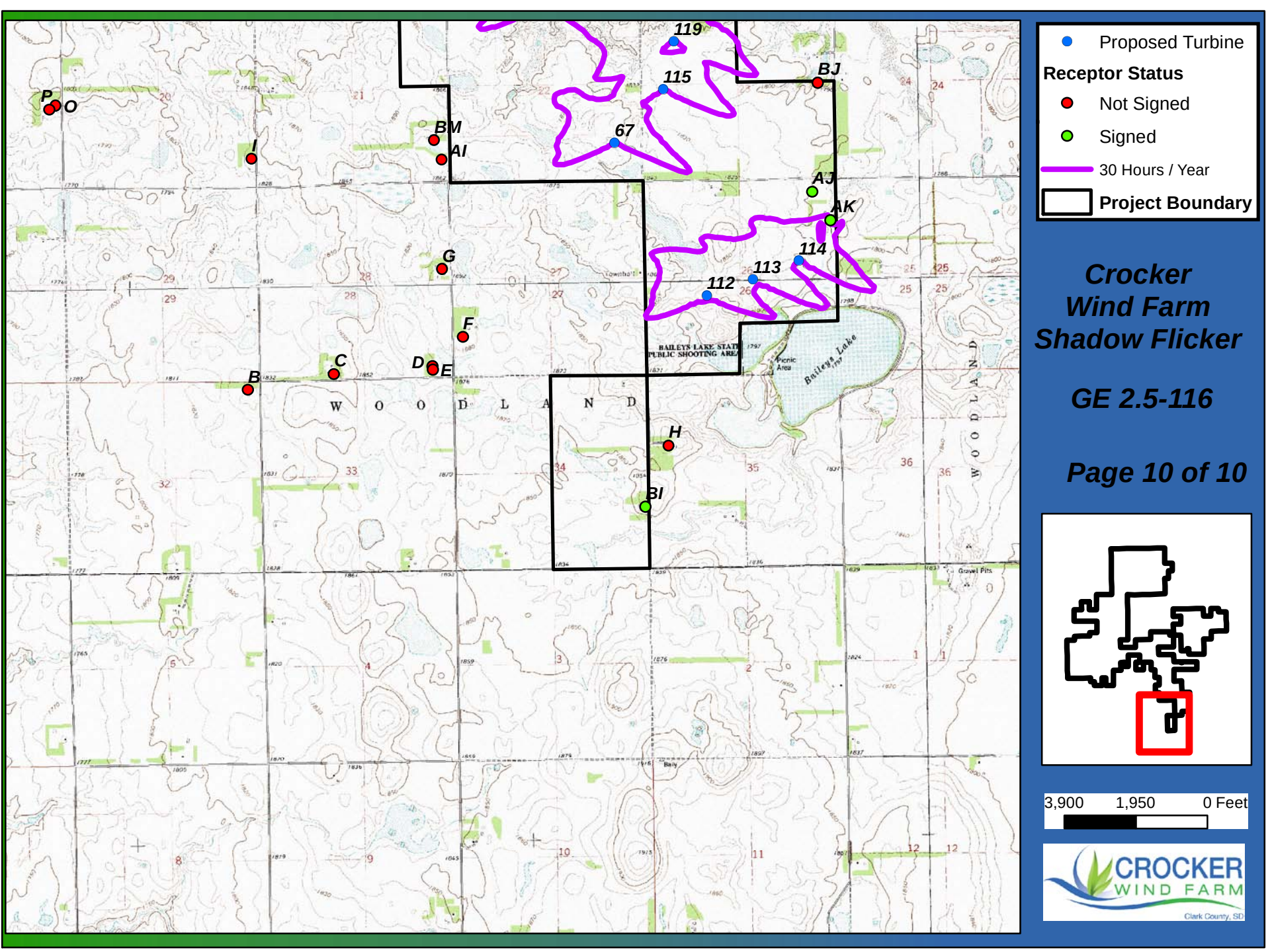
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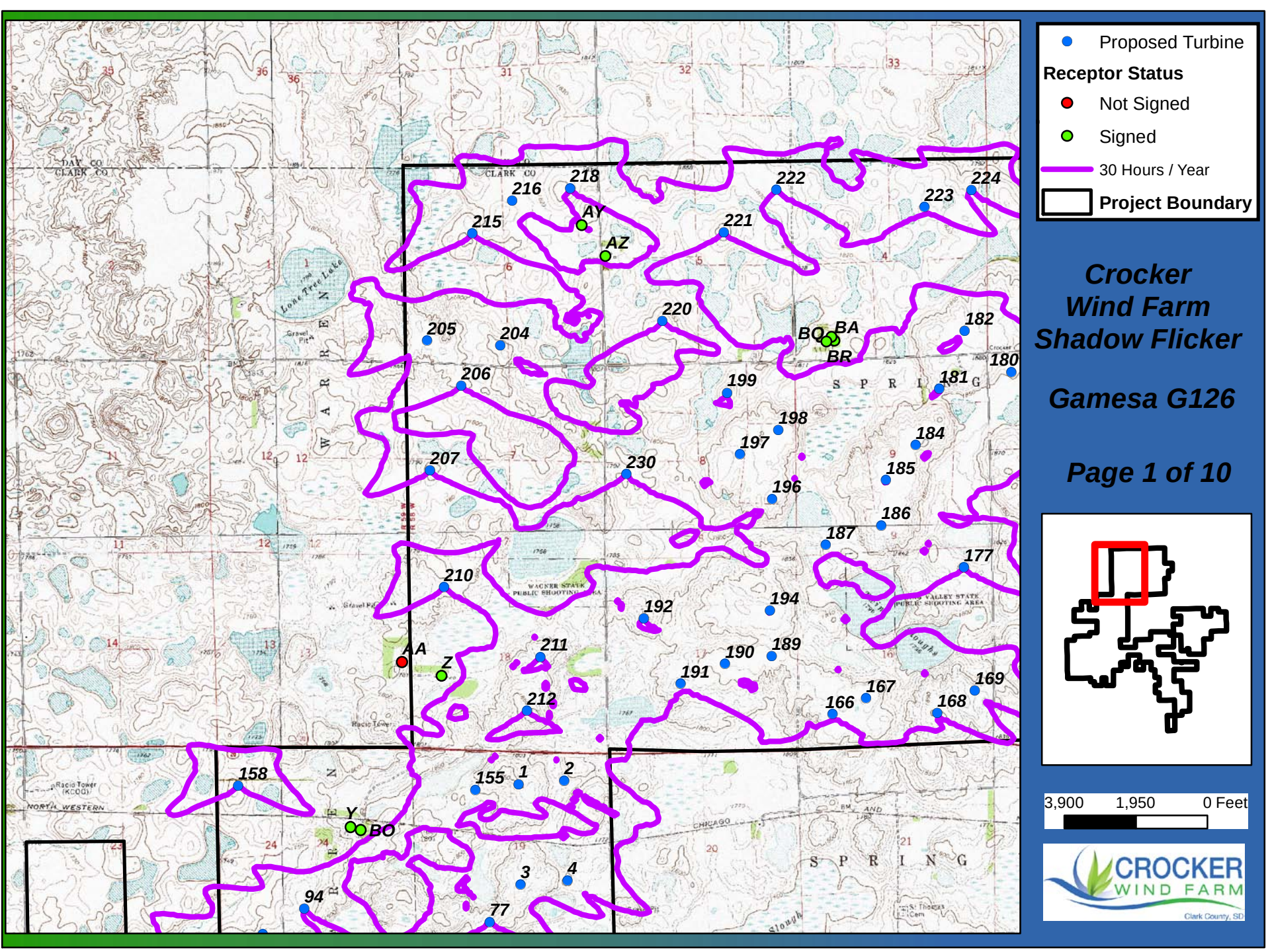
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Crocker Wind Farm Shadow Flicker
Gamesa G126
Page 1 of 10
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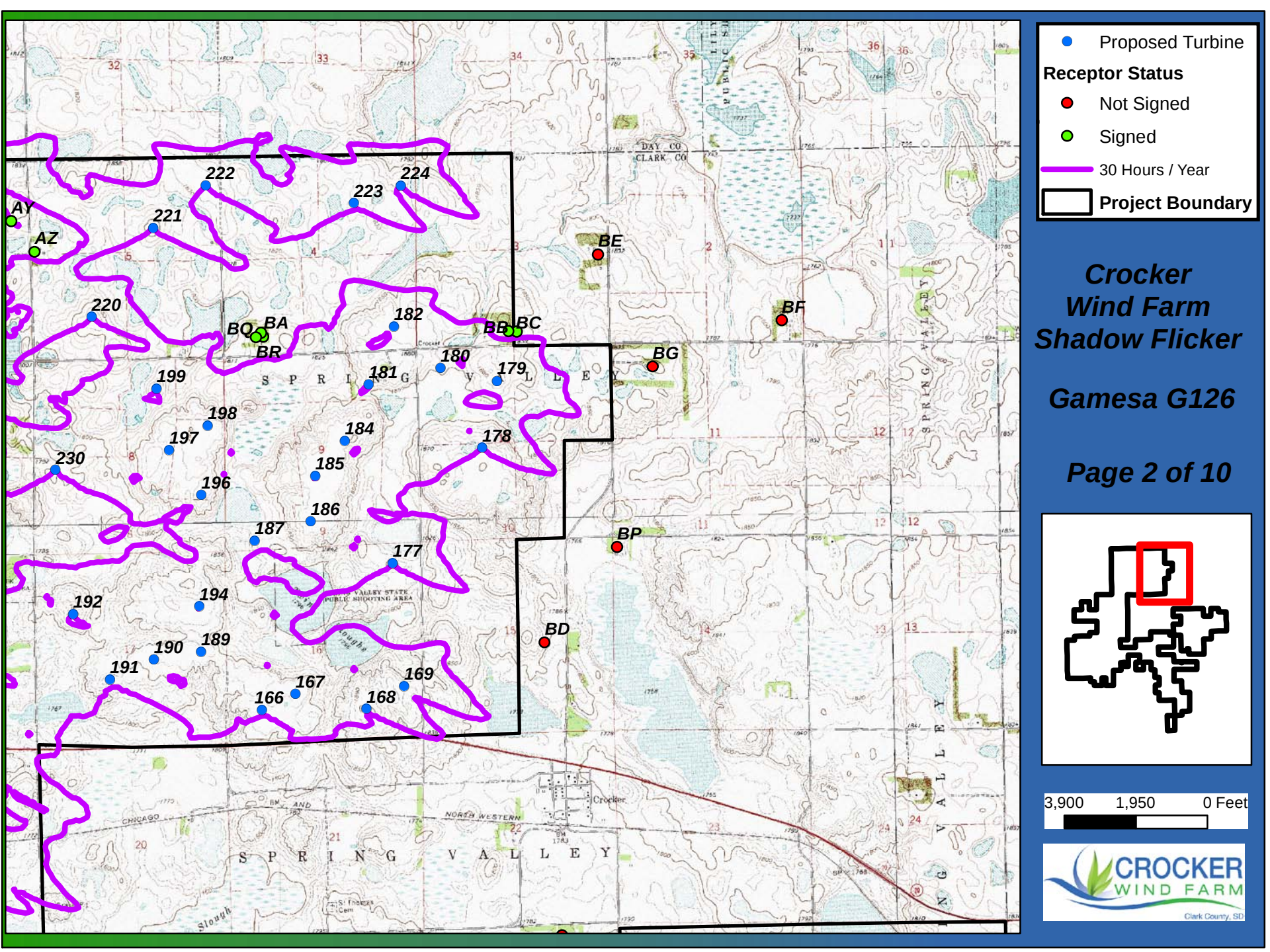
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Crocker Wind Farm Shadow Flicker
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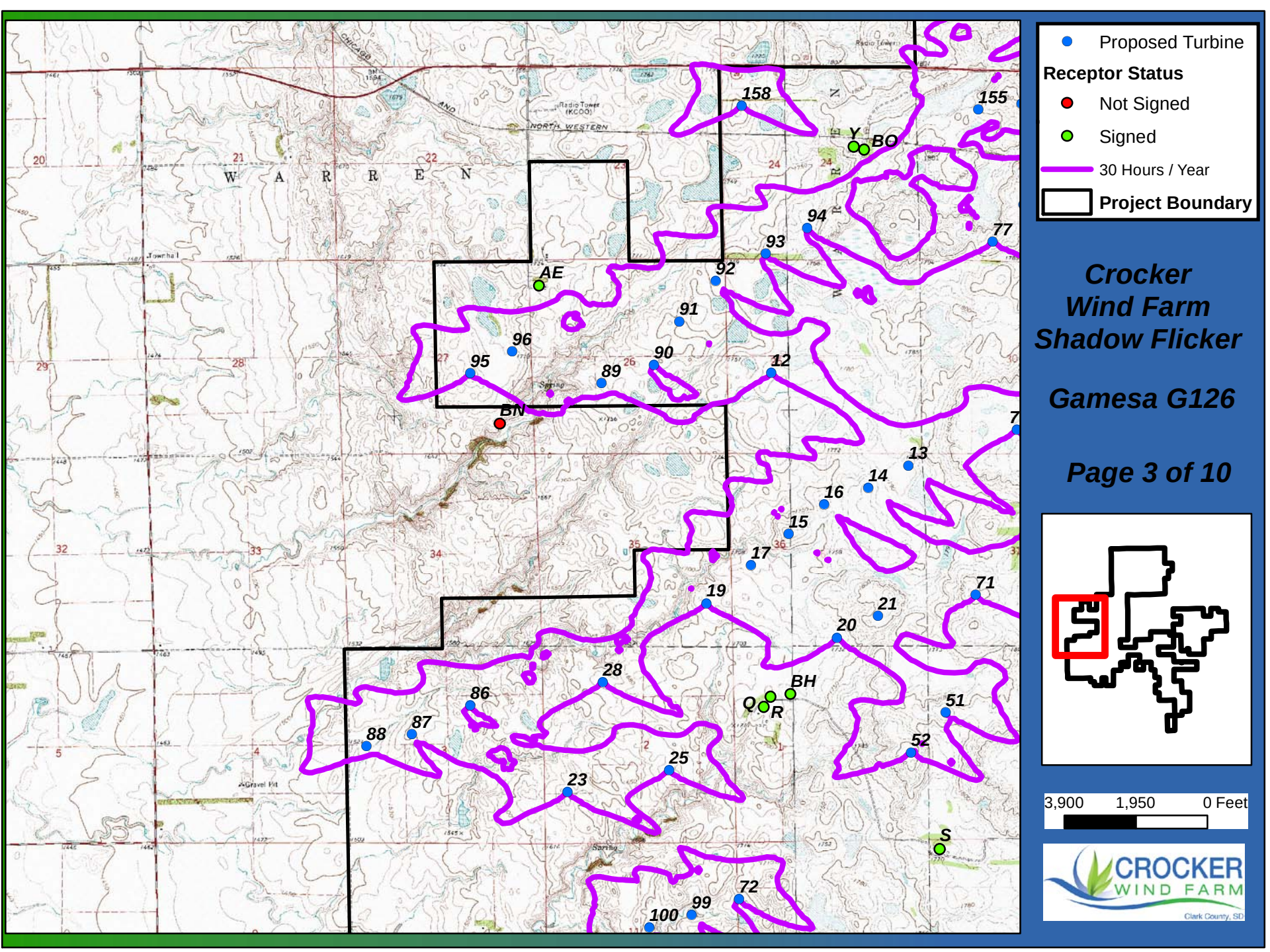
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CROCKER WIND FARM
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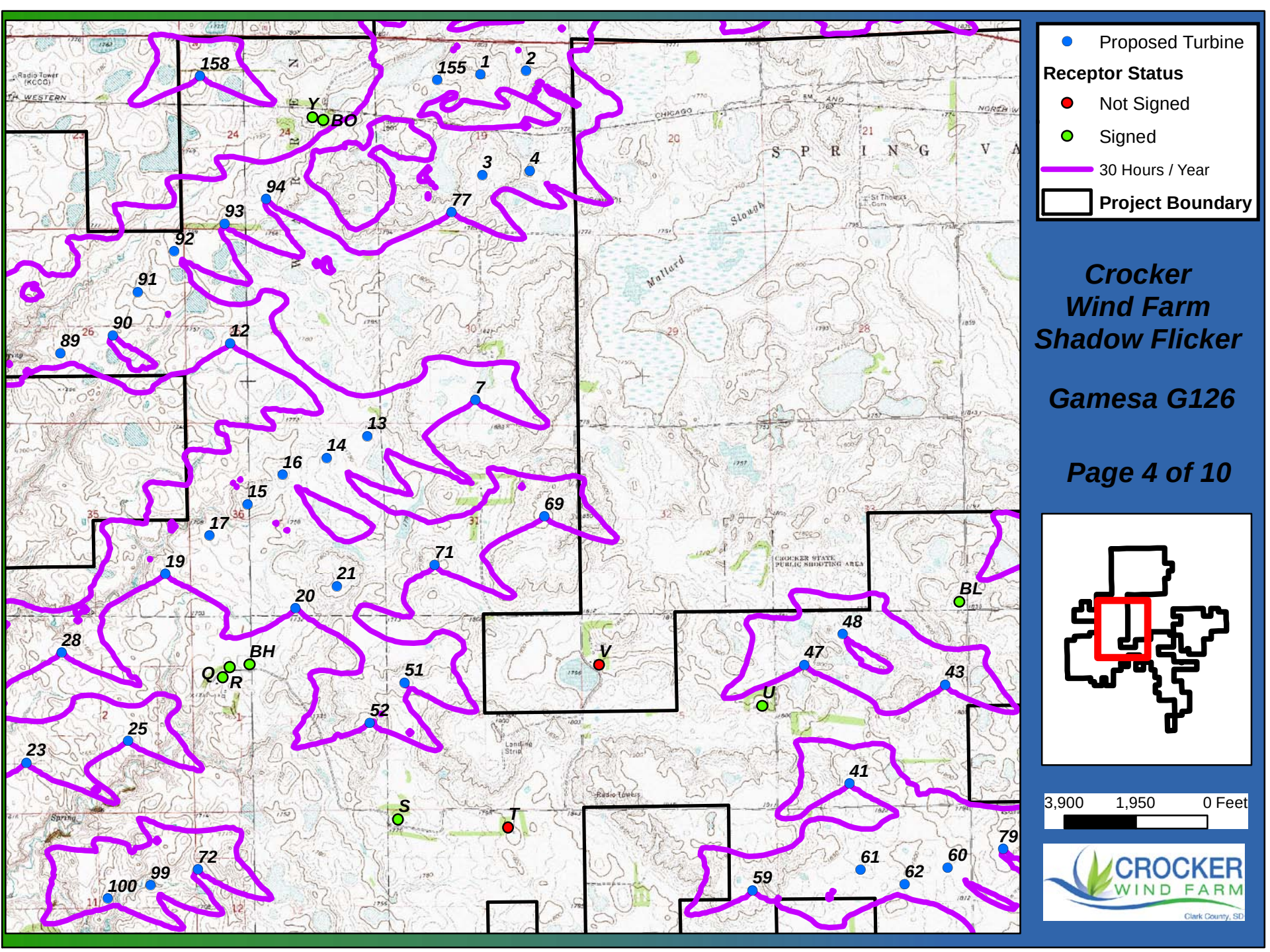
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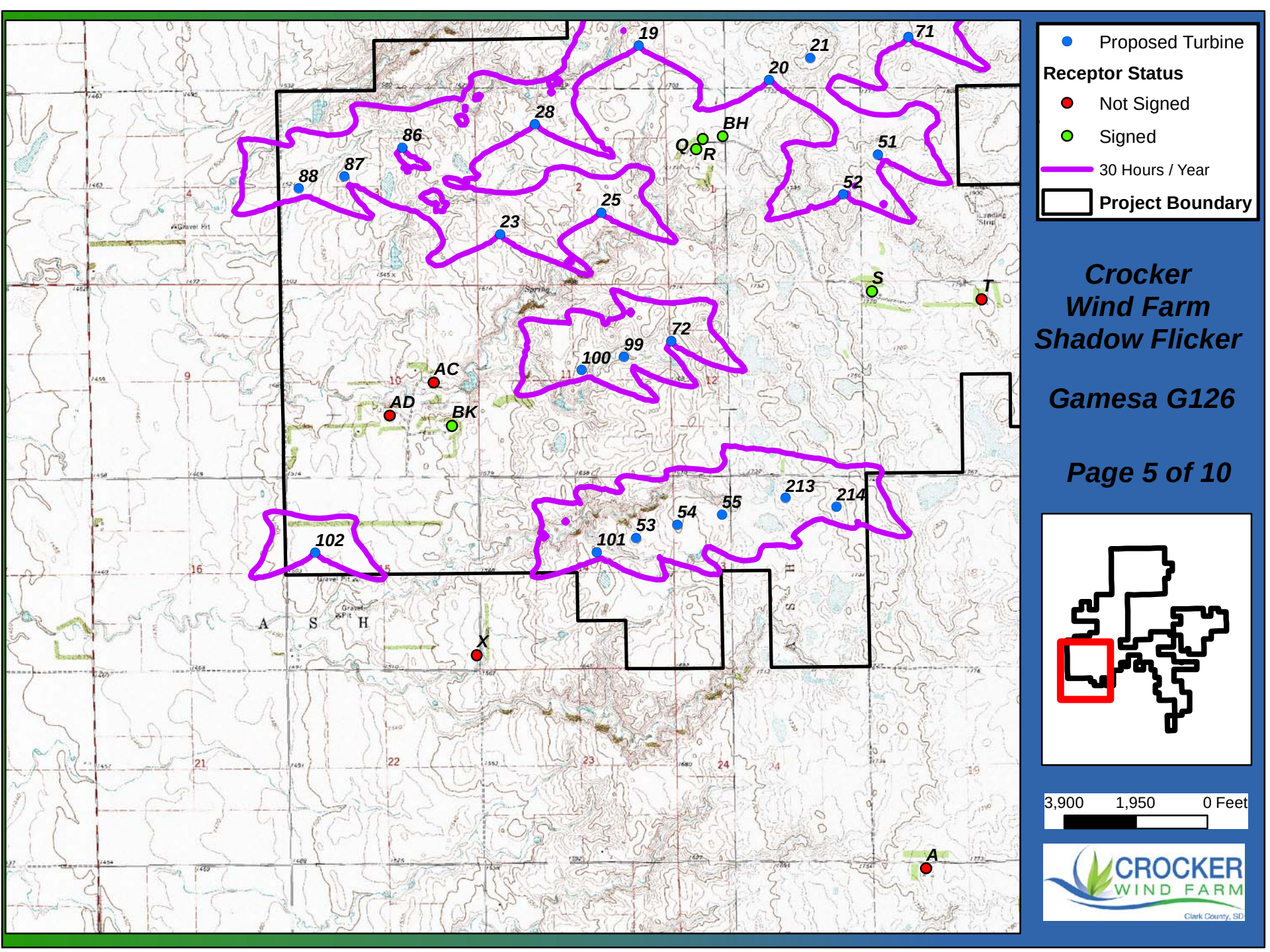
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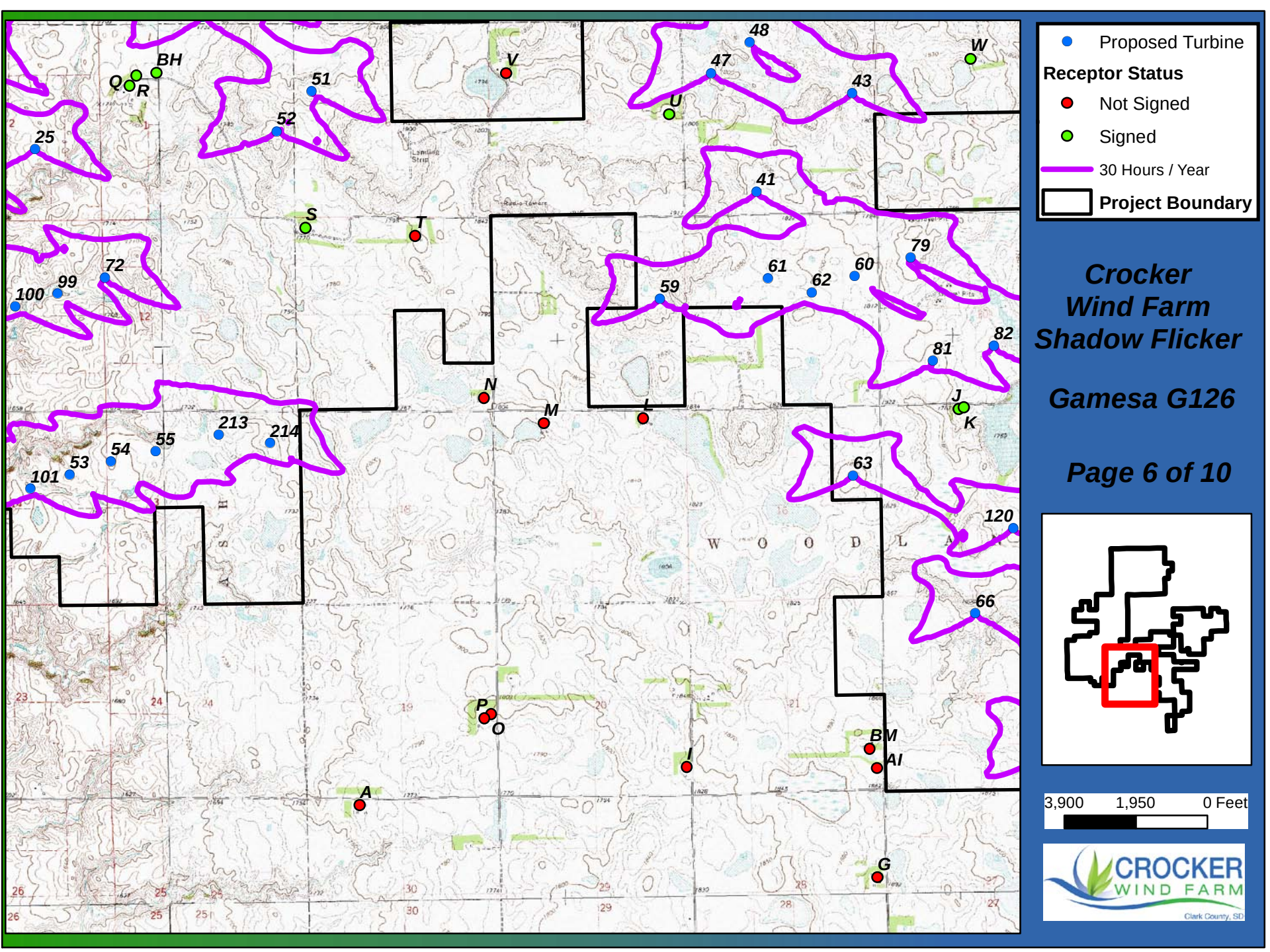
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Crocker Wind Farm Shadow Flicker
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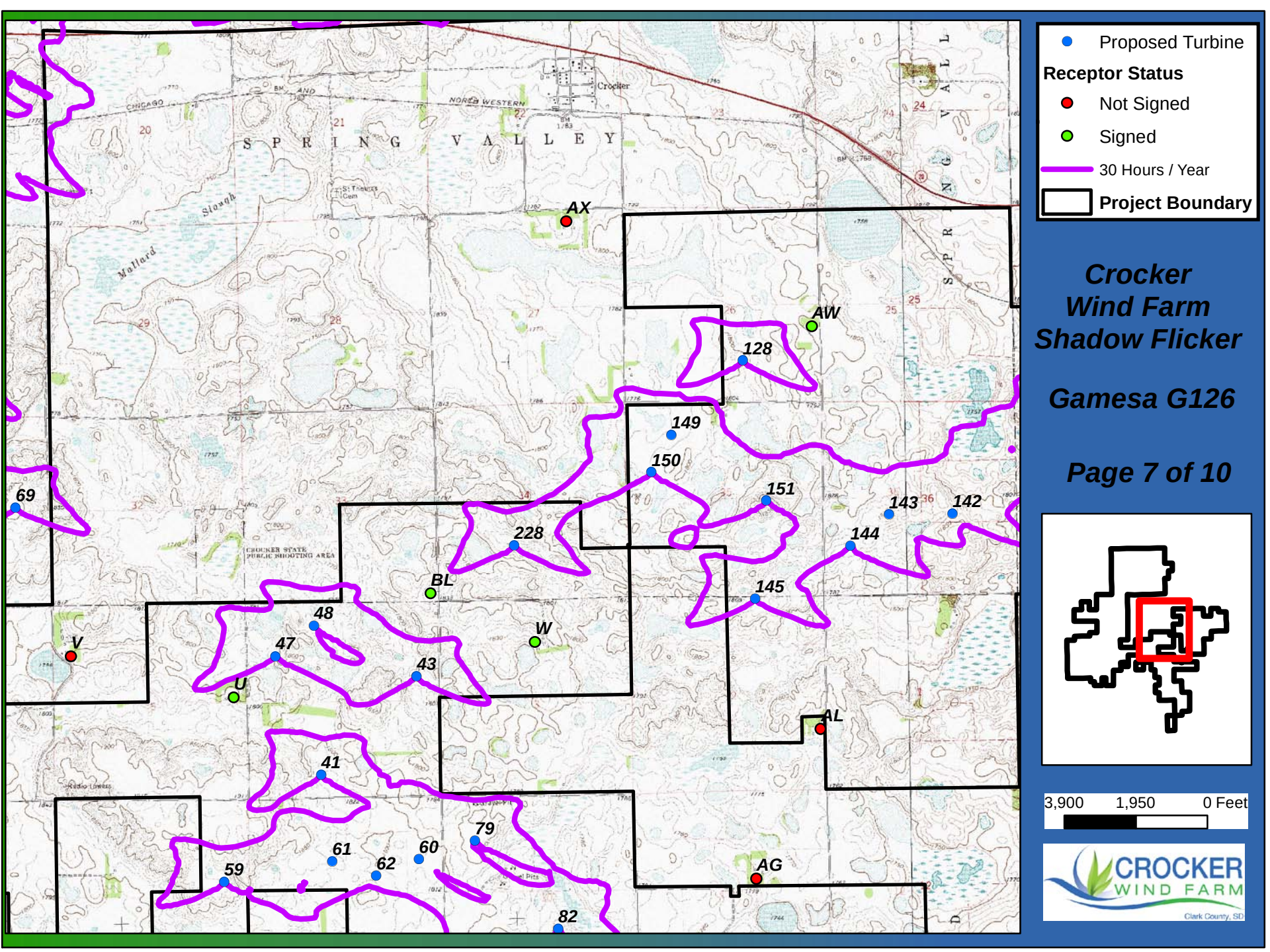
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CROCKER WIND FARM
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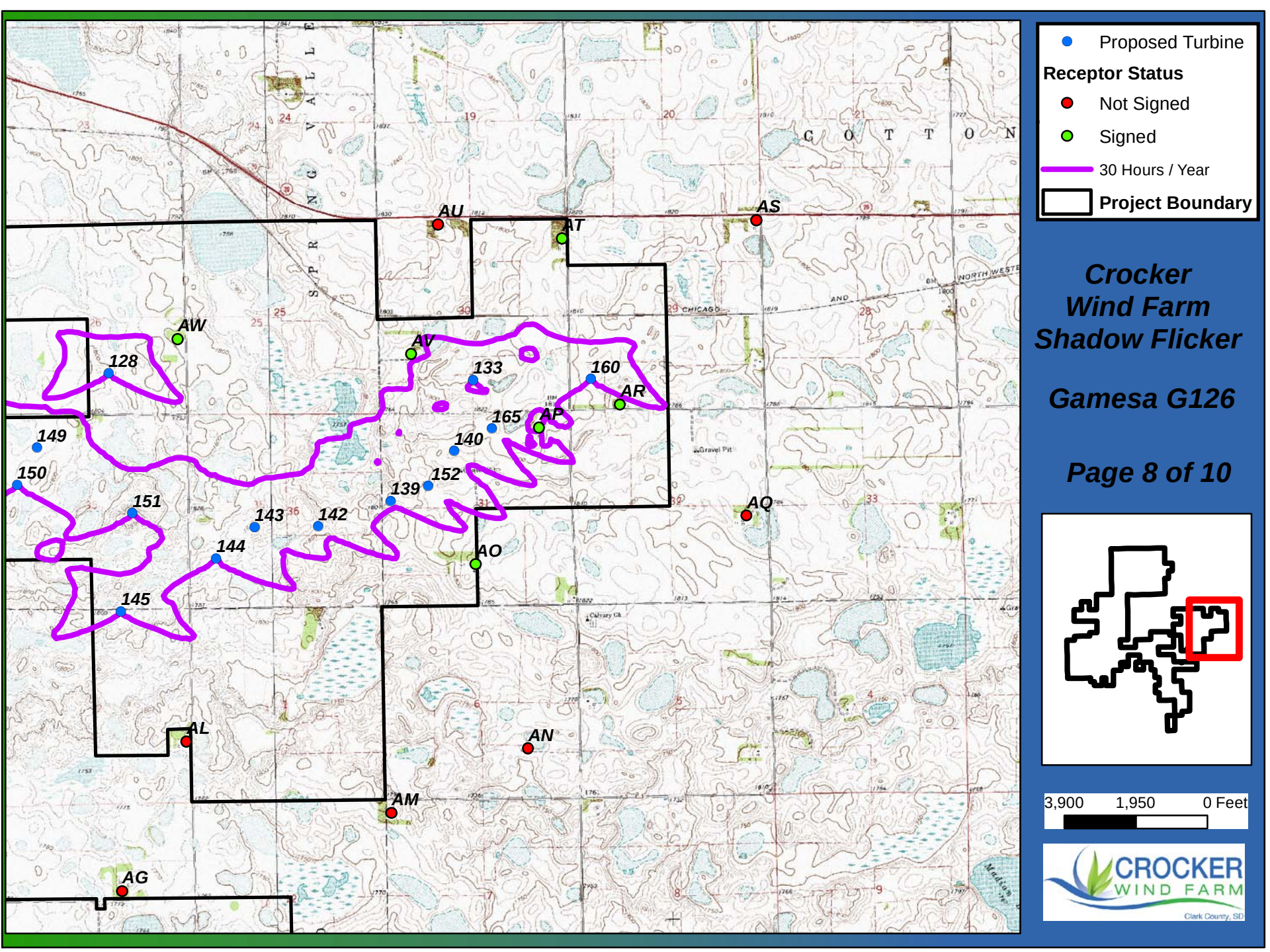
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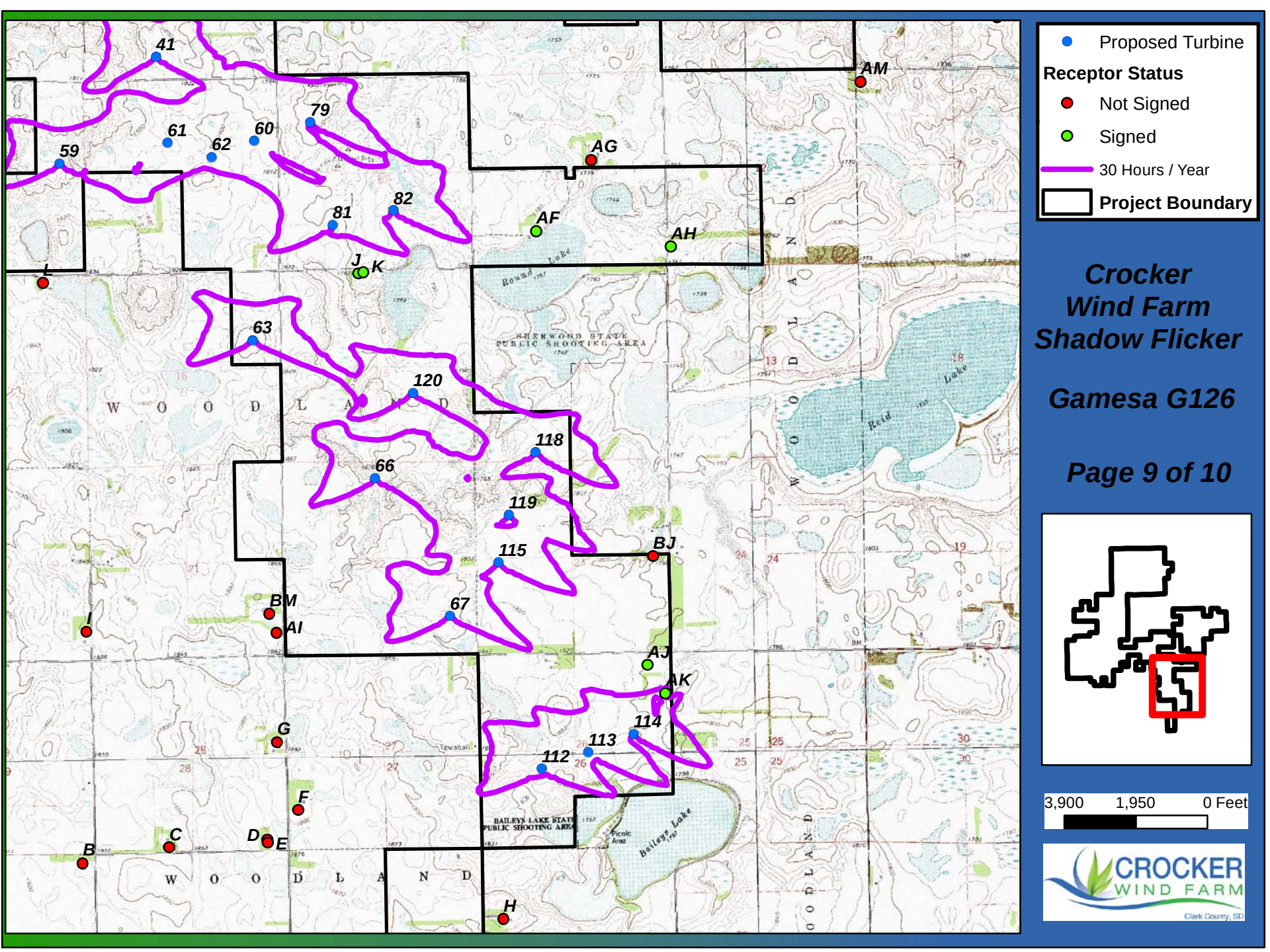
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Project Boundary
Crocker Wind Farm Shadow Flicker
Gamesa G126
Page 9 of 10
3,900 1,950 0 Feet
CROCKER WIND FARM
Clark County, SD
41
79
61
60
62
59
AG
AM
81
82
AF
AH
J
K
L
63
120
118
66
119
115
BJ
BM
67
I
AI
AJ
AK
G
114
113
112
F
B
C
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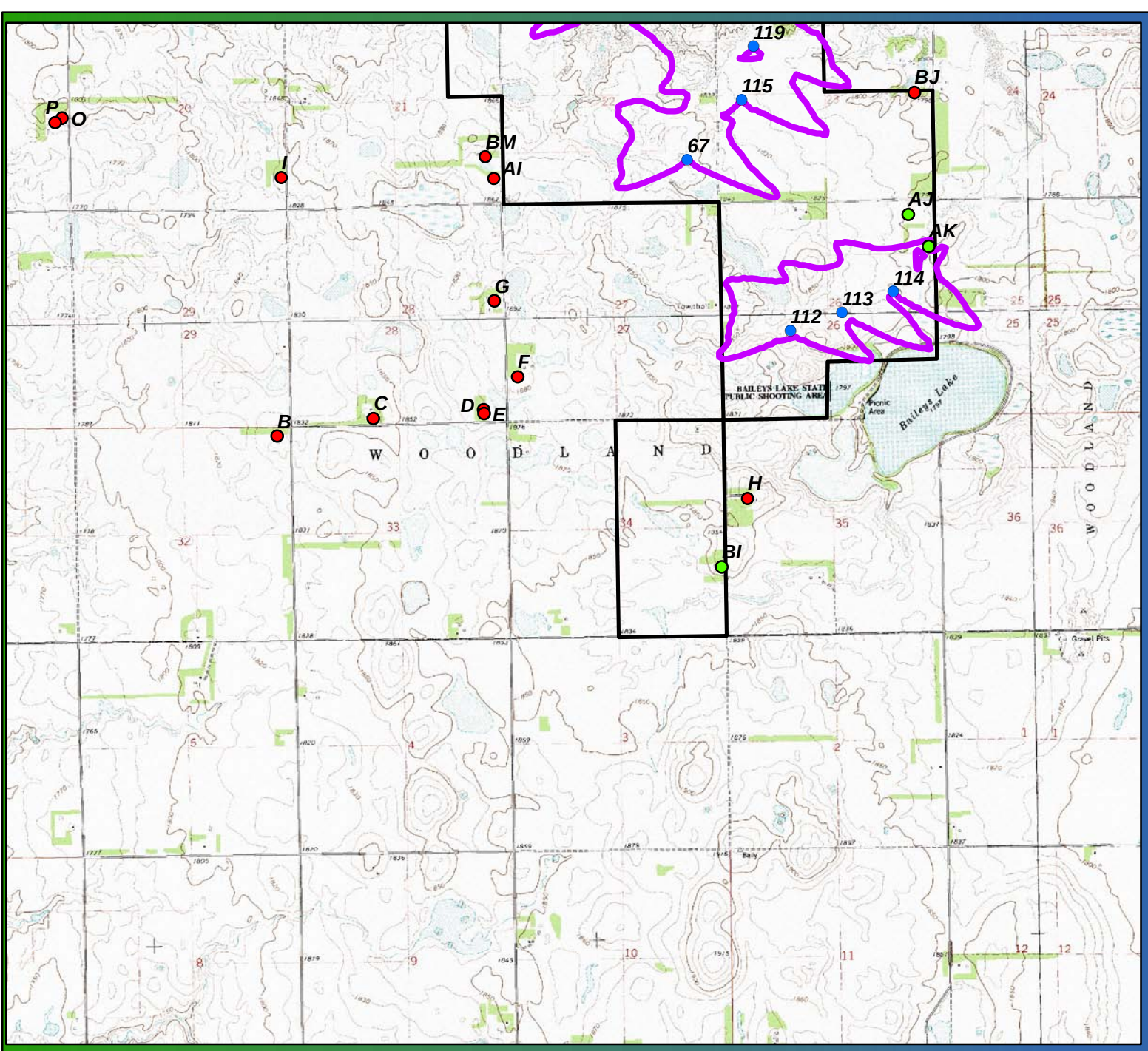
E
H
WOODLAND
SHERWOOD STATE PUBLIC SHOOTING AREA
BAILEYS LAKE STATE PUBLIC SHOOTING AREA
Reid Lake
Bailey Lake
Picnic Area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BJ
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BM
AI
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AJ
AK
114
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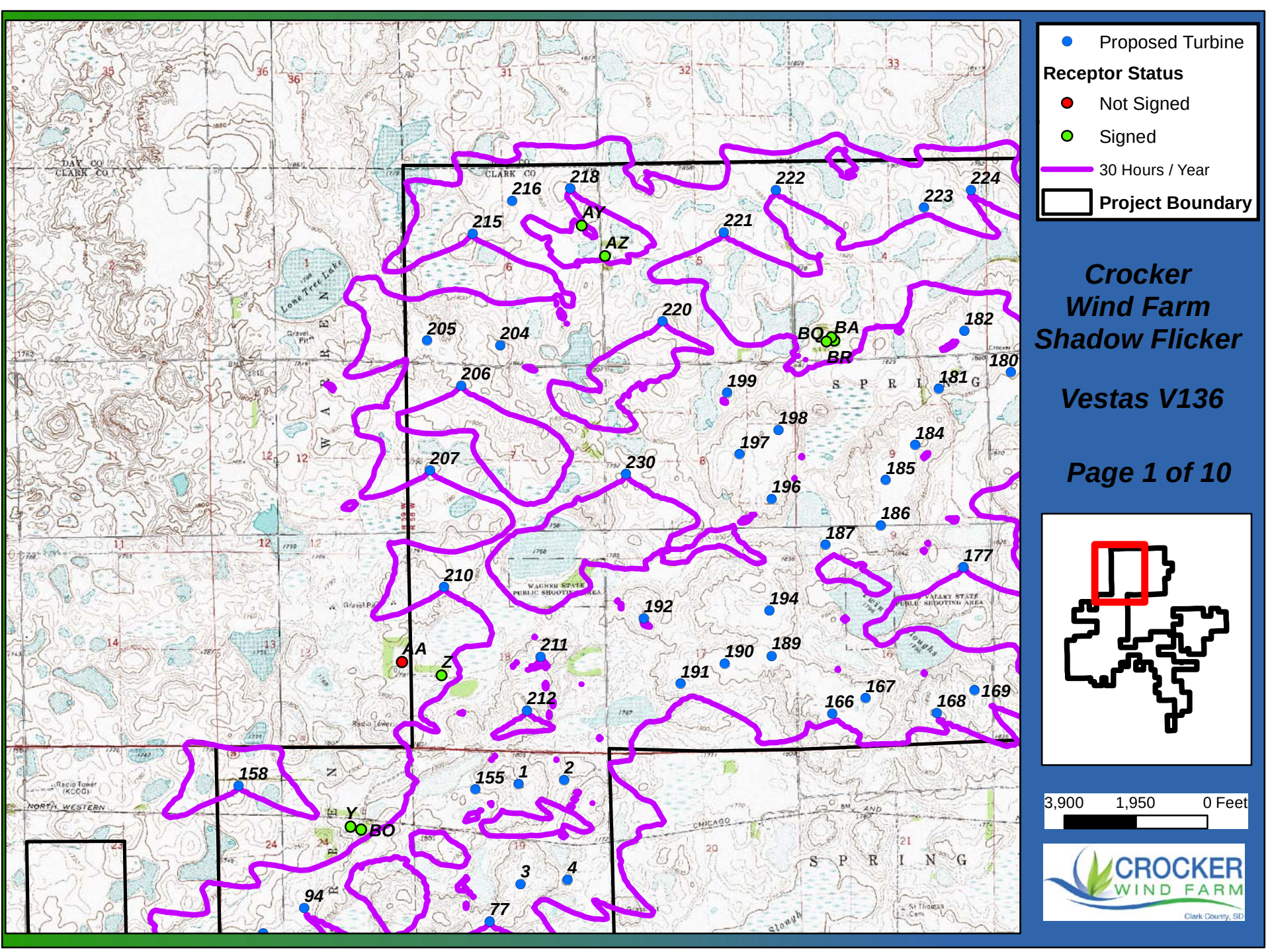
F
C
D
E
B
BAILEYS LAKE STATE PUBLIC SHOOTING AREA
Bailey's Lake
Picnic Area
WOODLAND
H
BI
Gravel Pits
Proposed Turbine
Receptor Status
Not Signed
Signed
30 Hours / Year
Project Boundary
Crocker Wind Farm Shadow Flicker
Gamesa G126
Page 10 of 10
3,900
1,950
0 Feet
CROCKER WIND FARM
Clark County, SD


Proposed Turbine
Receptor Status
Not Signed
Signed
30 Hours / Year
Project Boundary
Crocker Wind Farm Shadow Flicker
Vestas V136
Page 1 of 10
3,900 1,950 0 Feet
CROCKER WIND FARM
Clark County, SD
216
218
222
224
223
215
AY
221
AZ
220
205
204
BQ
BA
182
BR
180
206
199
181
198
184
197
207
230
185
196
186
187
177
210
192
194
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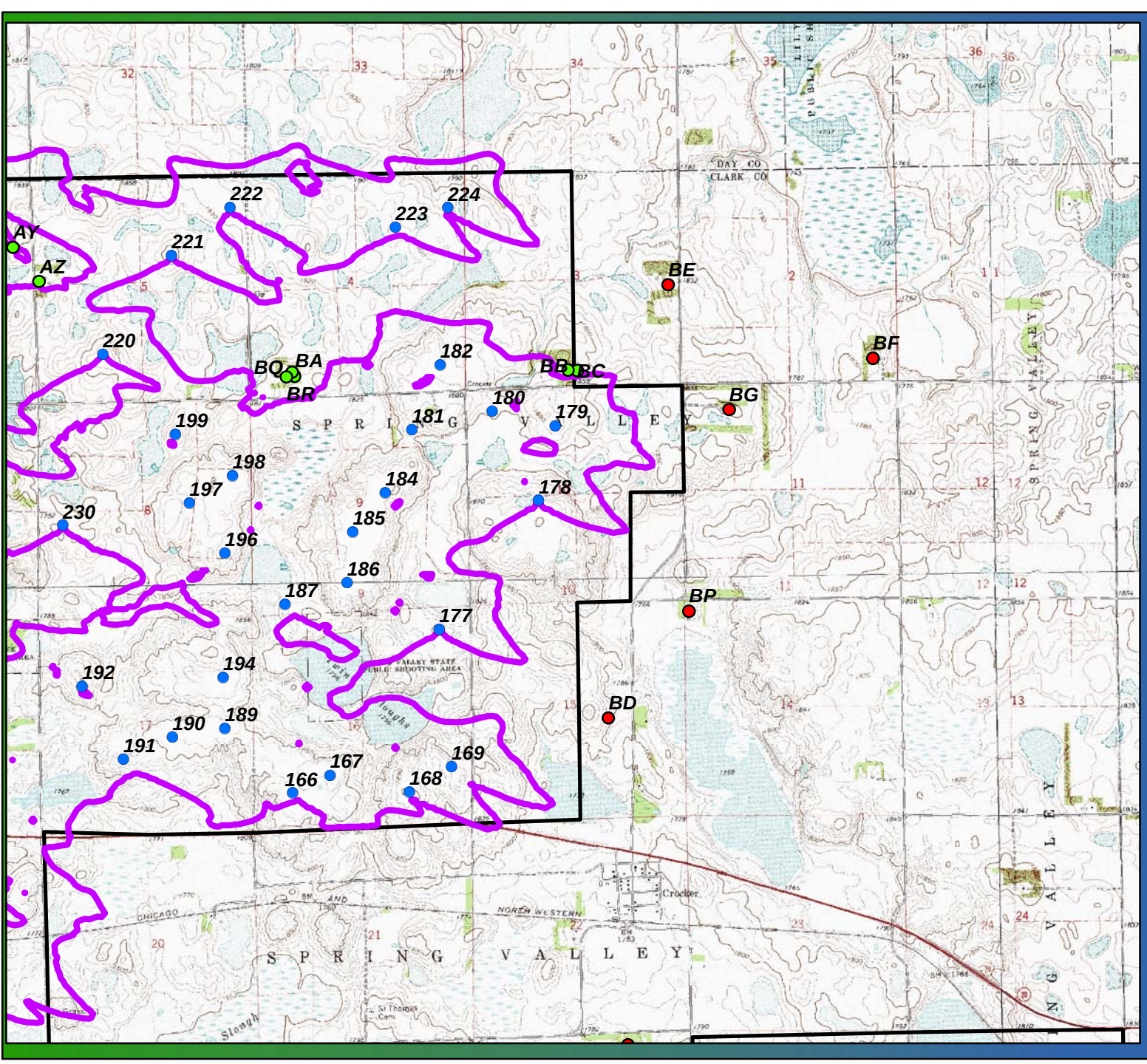
1
2
Y
BO
3
4
94
77



Proposed Turbine

Receptor Status

Not Signed

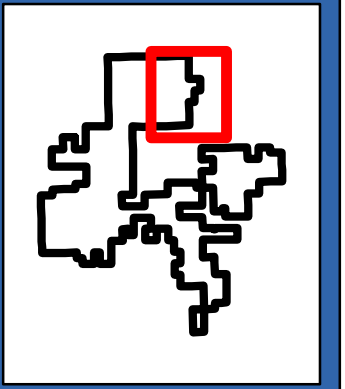
Signed

30 Hours / Year

Project Boundary

Crocker Wind Farm Shadow Flicker

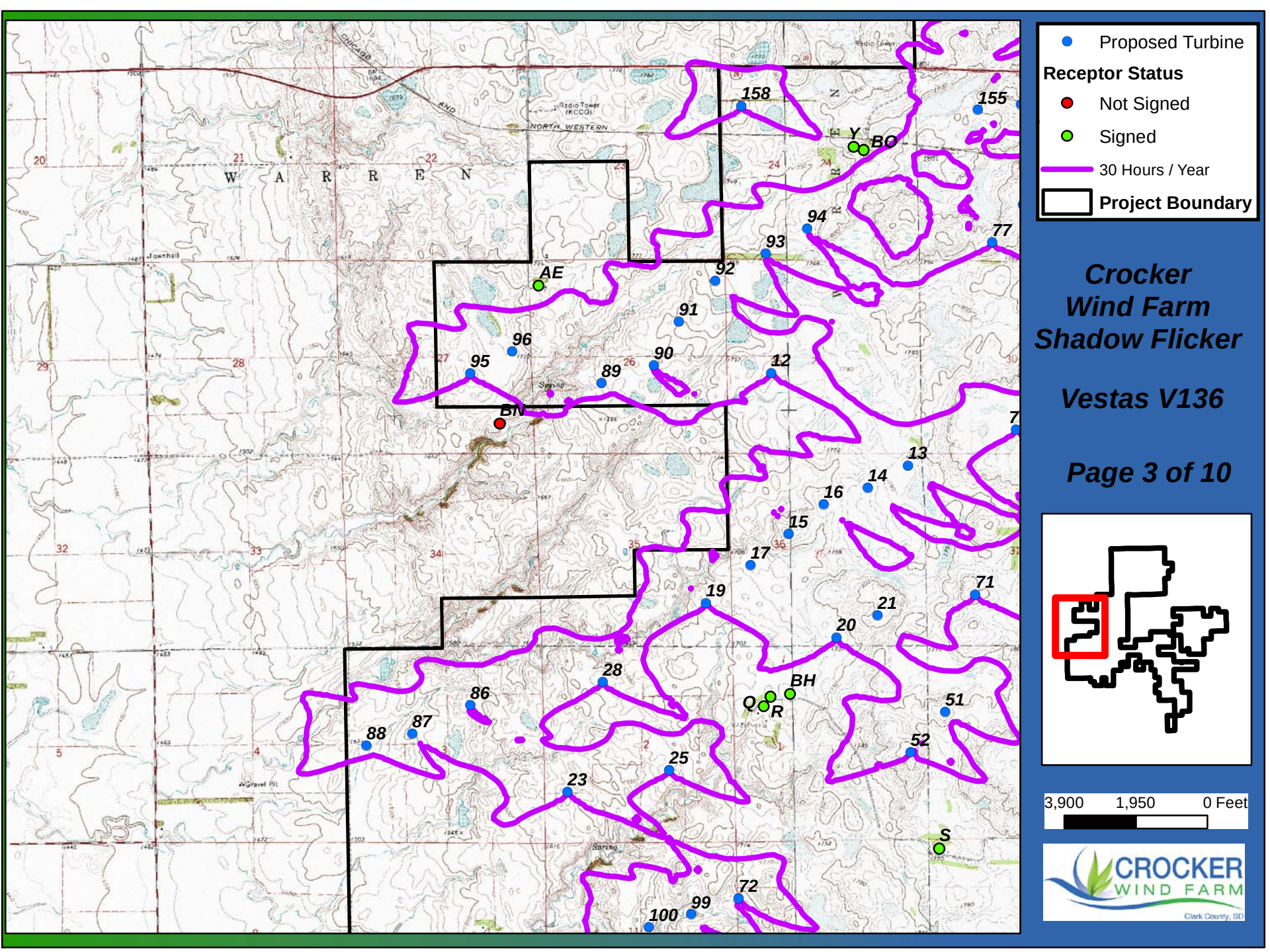
Vestas V136



3,900 1,950 0 Feet

CROCKER WIND FARM

Clark County, SD


Proposed Turbine
Receptor Status
Not Signed
Signed
30 Hours / Year
Project Boundary
Crocker Wind Farm Shadow Flicker
Vestas V136
Page 3 of 10
3,900 1,950 0 Feet
CROCKER WIND FARM
Clark County, SD
158
155
Y
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BH
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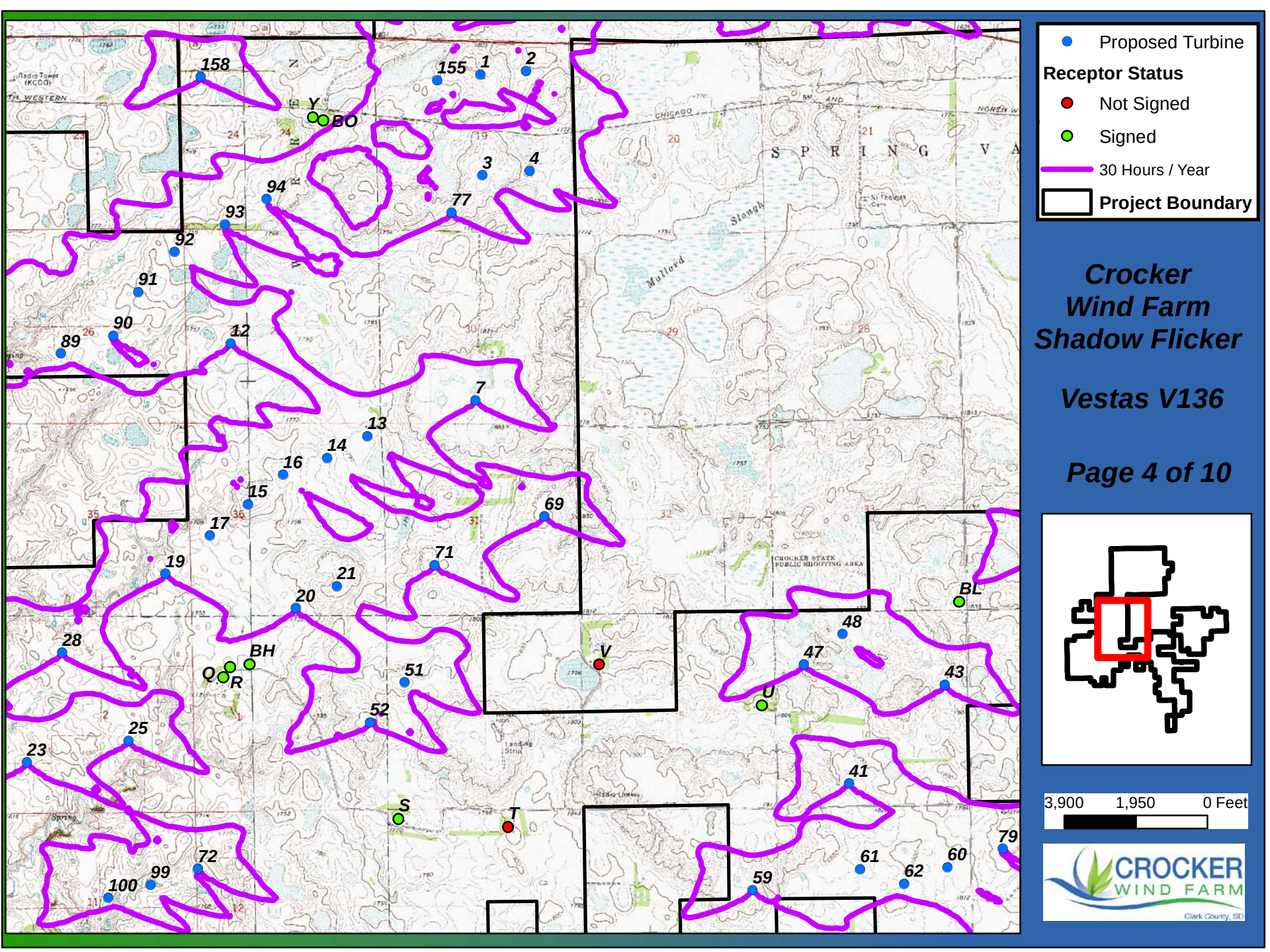
72
99
100
WARREN
NORTH WESTERN
Townhall
Gravel Pit
Spring


Proposed Turbine
Receptor Status
Not Signed
Signed
30 Hours / Year
Project Boundary
Crocker
Wind Farm
Shadow Flicker
Vestas V136
Page 4 of 10
3,900
1,950
0 Feet
CROCKER
WIND FARM
Clark County, SD
158
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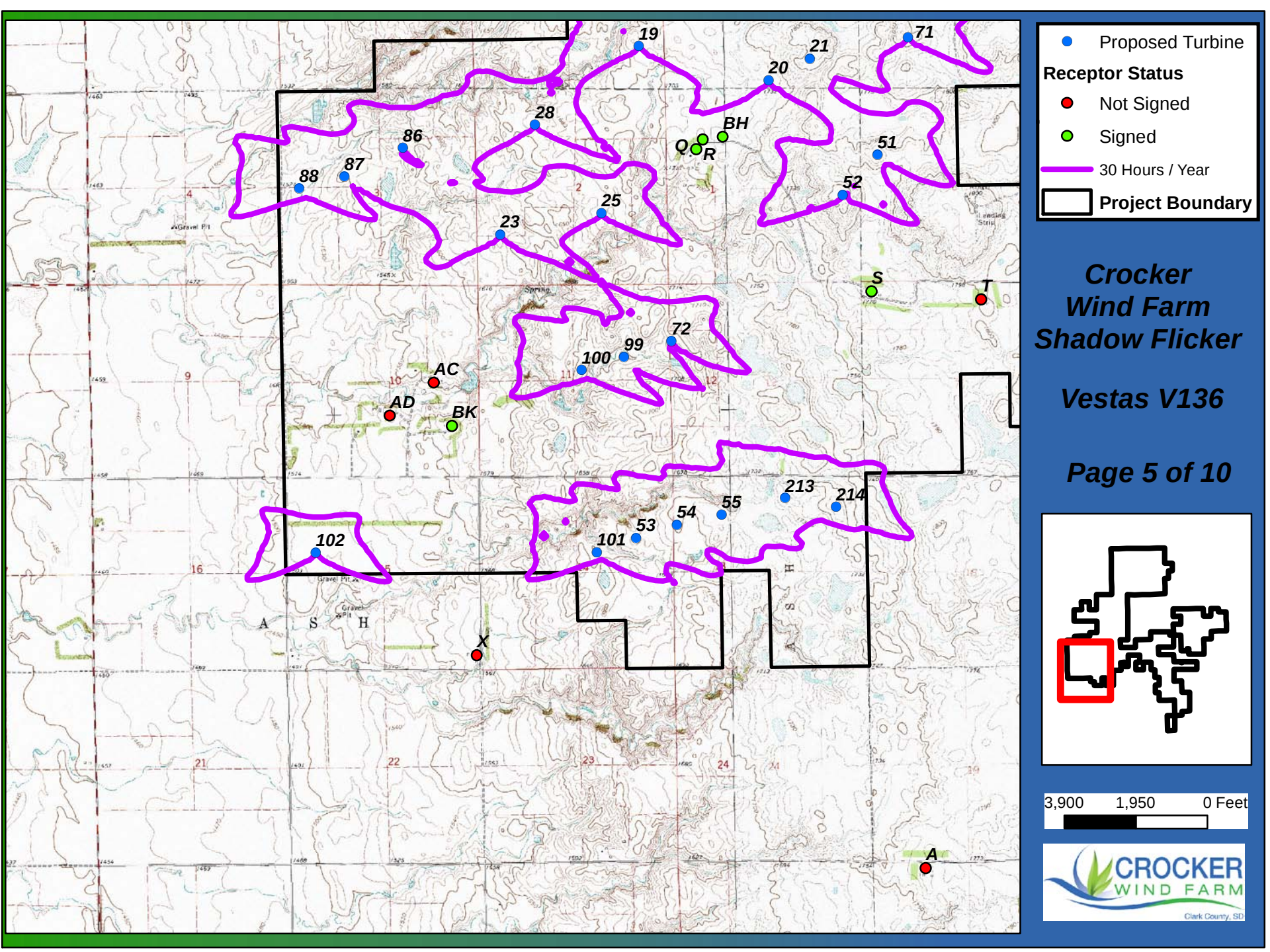
Proposed Turbine
Receptor Status
Not Signed
Signed
30 Hours / Year
Project Boundary
Crocker Wind Farm Shadow Flicker
Vestas V136
Page 5 of 10
3,900 1,950 0 Feet
CROCKER WIND FARM
Clark County, SD
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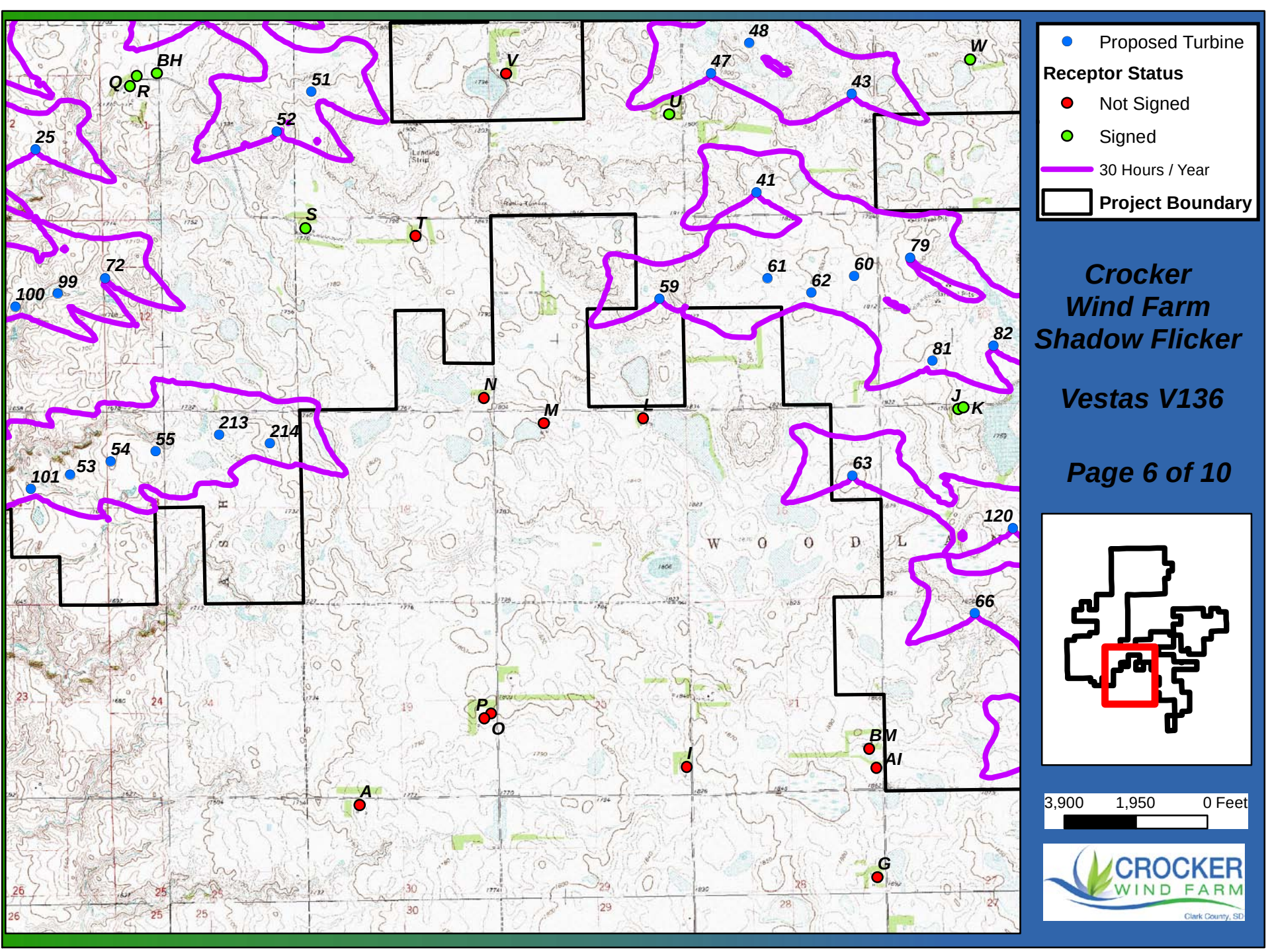
Proposed Turbine
Receptor Status
Not Signed
Signed
30 Hours / Year
Project Boundary
Crocker Wind Farm Shadow Flicker
Vestas V136
Page 6 of 10
3,900 1,950 0 Feet
CROCKER WIND FARM
Clark County, SD
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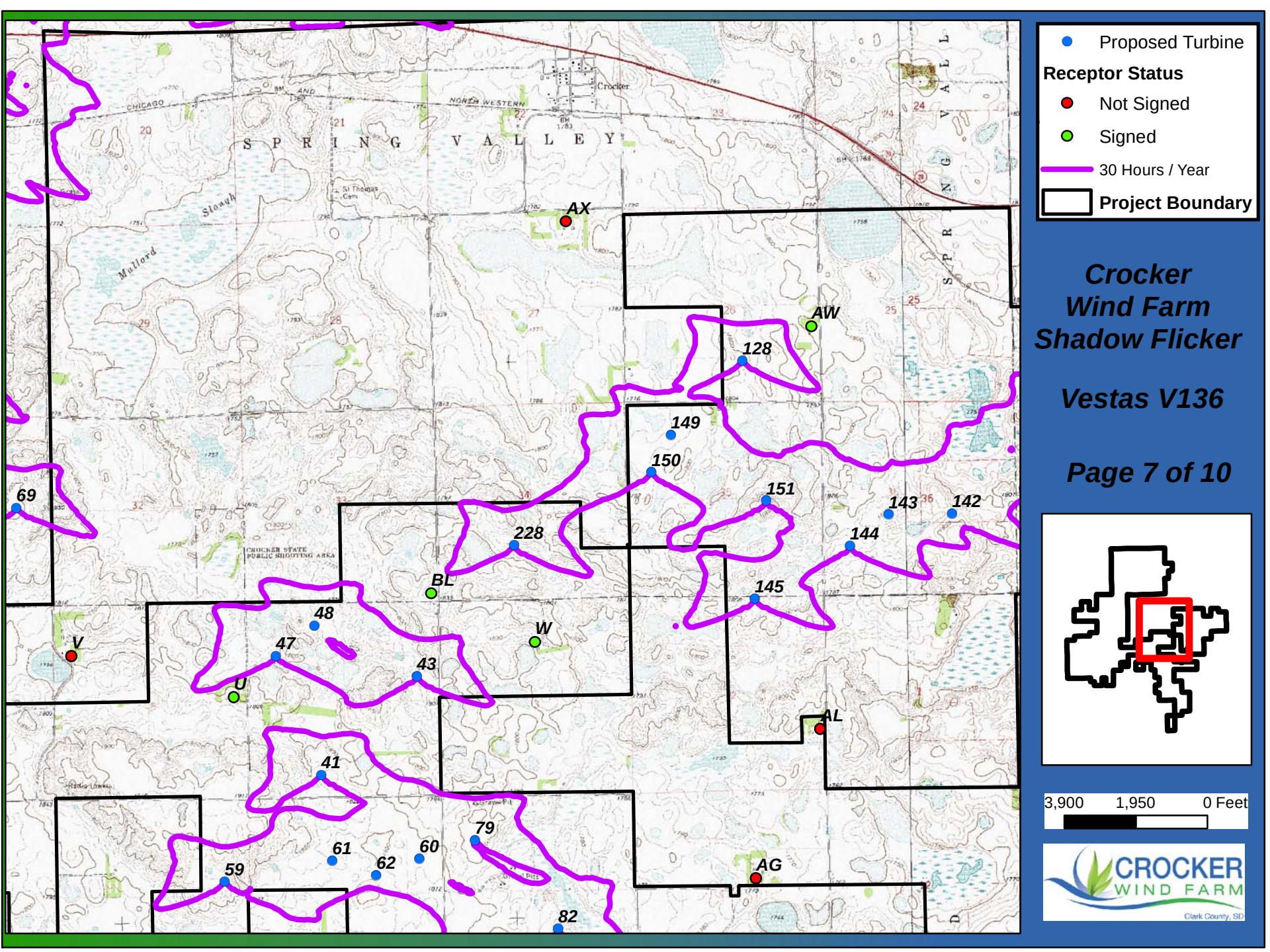
Proposed Turbine
Receptor Status
Not Signed
Signed
30 Hours / Year
Project Boundary
Crocker Wind Farm Shadow Flicker
Vestas V136
Page 7 of 10
3,900 1,950 0 Feet
CROCKER WIND FARM
Clark County, SD
SPRING VALLEY
Crocker
CROCKER STATE PUBLIC SHOOTING AREA
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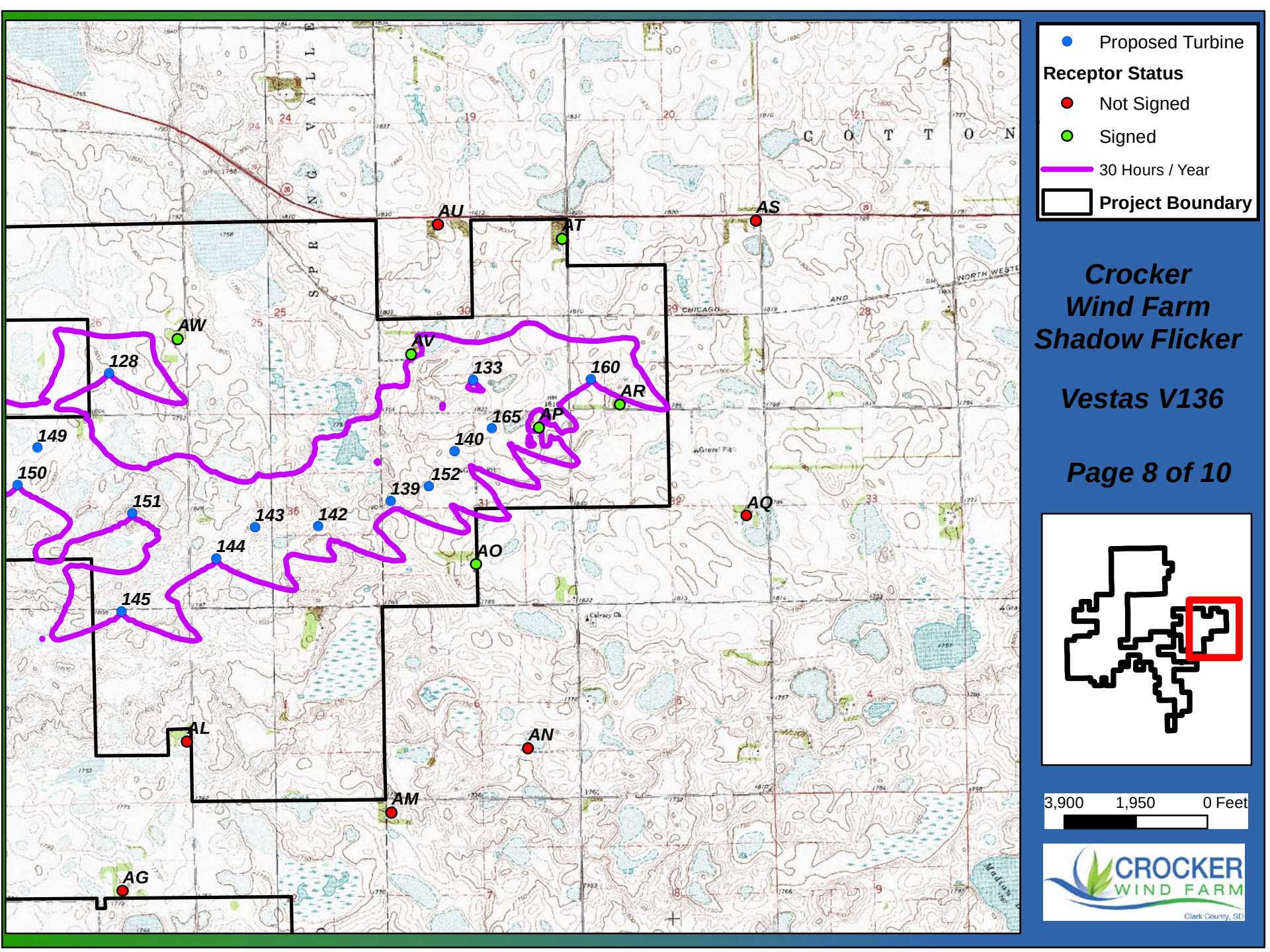
Proposed Turbine
Receptor Status
Not Signed
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30 Hours / Year
Project Boundary
Crocker Wind Farm Shadow Flicker
Vestas V136
Page 8 of 10
3,900 1,950 0 Feet
CROCKER WIND FARM
Clark County, SD
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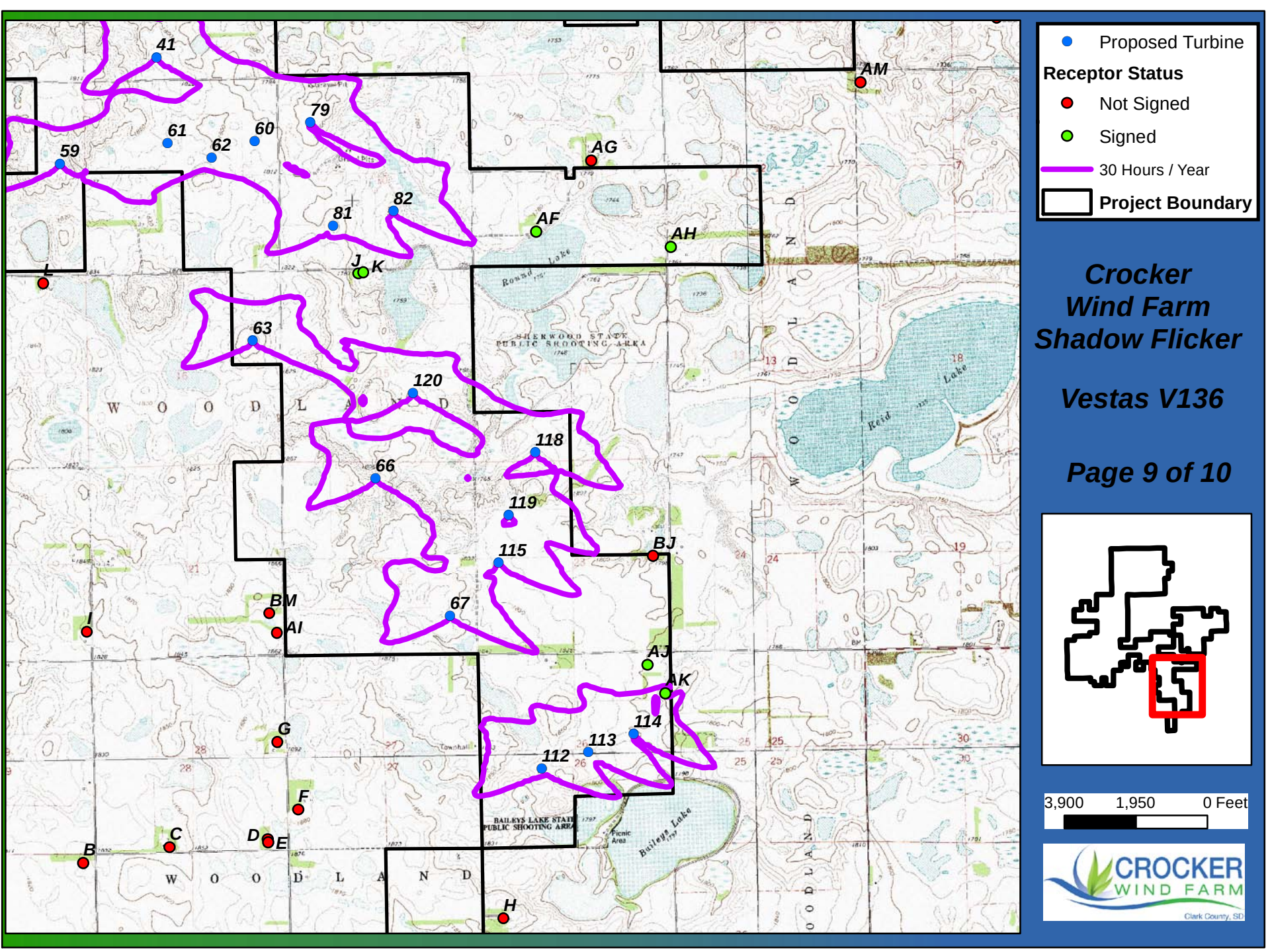
Proposed Turbine
Receptor Status
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Signed
30 Hours / Year
Project Boundary
Crocker Wind Farm Shadow Flicker
Vestas V136
Page 9 of 10
3,900 1,950 0 Feet
CROCKER WIND FARM
Clark County, SD
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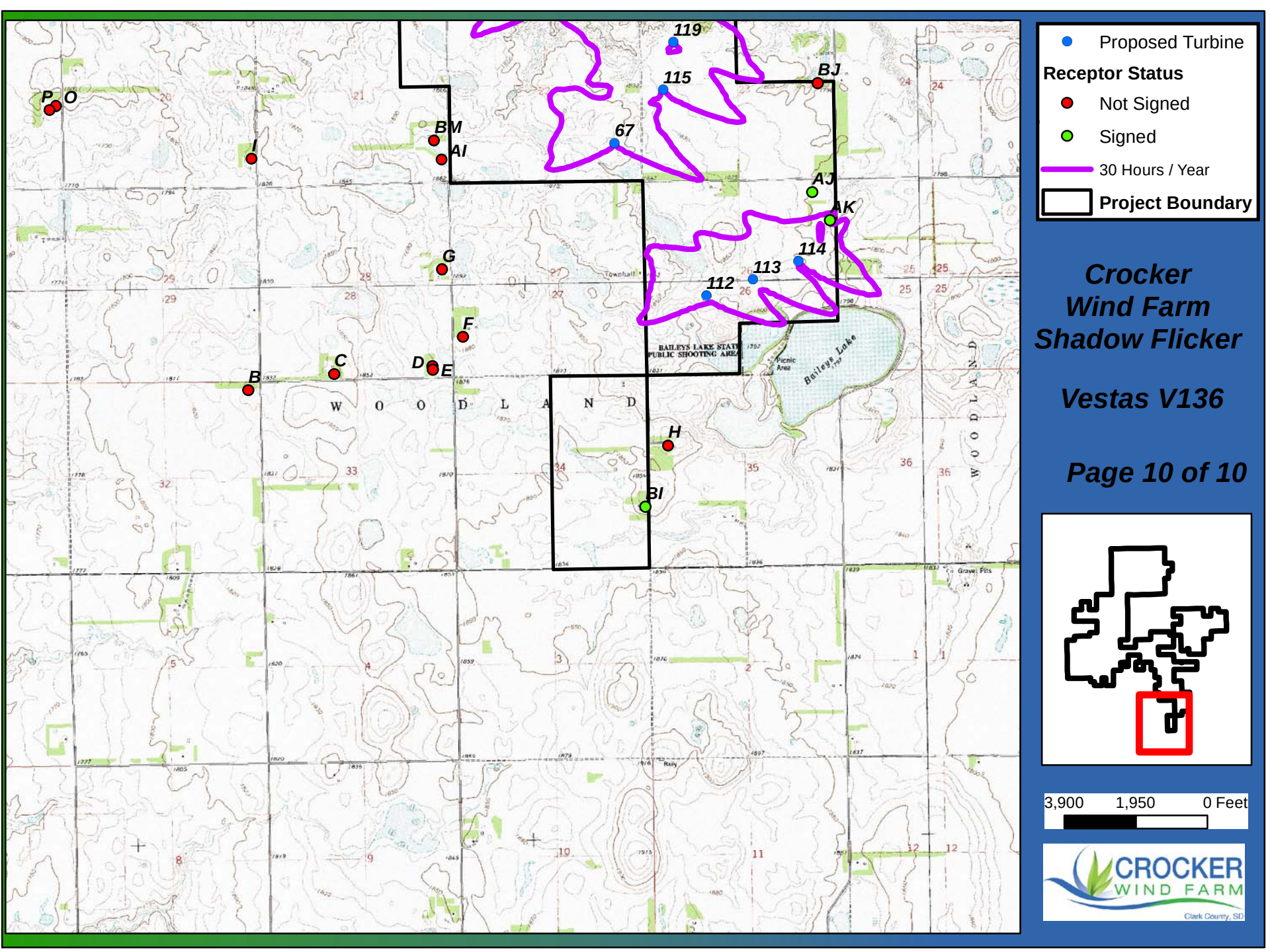
SHERWOOD STATE PUBLIC SHOOTING AREA
BAILEYS LAKE STATE PUBLIC SHOOTING AREA
Round Lake
Reid Lake
Baileys Lake
Picnic Area
Townhall
WOODLAND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30 Hours / Year
Project Boundary
Crocker Wind Farm Shadow Flicker
Vestas V136
Page 10 of 10
3,900 1,950 0 Feet
CROCKER WIND FARM
Clark County, SD
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WOODLAND
BAILEYS LAKE STATE PUBLIC SHOOTING AREA
Bailey's Lake
Picnic Area
Townhall
Gravel Pits